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THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY.

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☞ An asterisk (*) denotes an illustrated article

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WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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THE LOWE PROCESS.

We give our readers to-day the statement of Mr. Dwight as to the success, thus far, of the Lowe Process, and all that is claimed for it can be gathered from the frank words therein contained. There is one thing which we have always commended in this connection, and that is the faith that its managers have shown in the ultimate success of their scheme. They have put their own money in it, and some say *all* their money, for the purpose of showing what it can do; and, according to Mr. Dwight's own statement, they intend and expect to reap an abundant reward therefor, because they have already done much, and in four years have achieved a perfectly substantial success in every respect.

Of this they should be good judges, as they alone know exactly how much they have made by the scheme, and, from their standpoint, the future of the business seems assured. In whatever views we may have on this matter we wish it distinctly understood that we acknowledge ourselves second to none in the advocacy of all true progress in the science of gas making. We are wedded to *no* process or method, we have no axes to grind, and we have no prejudices that are not the result of honest conviction, and if, in this matter, we speak plainly, it is but an honest, frank expression of conviction arrived at from careful study. We do not claim to be a practical gas maker, but we do know one thing, in which we doubt not that all will agree, viz., that gas making is not *primarily* a philanthropic occupation, although there is no manufacture that directly and indirectly confers greater boons upon the communities who are so fortunate as to enjoy its results. The primary object, however, is all involved in the term "dollars and cents." Men become the owners of gas stocks, generally speaking, by paying their money for them with a view solely to the dividends which they expect, and when companies are well managed, they often get them; so that the most practical question, of all the many that enter into the conduct of the gas business, is to make it pay. It is not not enough for a manager to show his directors that a new idea, or an old one revamped and fitted up to suit the times, is scientifically correct and scientifically progressive, but he must show them also that it pays better than one already tried; and we do not hesitate to state it as an opinion, that no class of men would be so ready and anxious to adopt a new thing as the older gas companies, if it could be shown that a few cents per thousand could be saved on the first cost, and a result obtained equally good in every other respect.

The progress of all new inventions is somewhat checkered at first, and we are glad to learn that the Lowe process has passed that point, although up to a very recent date it has been no exception to the rule.

At Utica the process was reported perfect, but it burned down the plant, or, in other words, the building in which the process was conducted was set on fire and consumed, not by an enemy or an incendiary, but by the operation of the process itself. Of course it was an accident resulting from the stupidity of a workman which would not have happened if the engineer, or some other intelligent person, had been present to know exactly what to do, and had done it. But the fact still remains that to-day the works have not been rebuilt, although we are informed that the Utica company have bought the right to use the process and may, at some future time, try it again. It would be interesting to know upon what terms *exactly* the rights were purchased, but that is none of our business.

The next great triumph was at Philadelphia. Here, for a while, it supplied, of itself, the Manayunk district with gas. The satisfaction with which some of the consumers were served, may be gathered from a communication in another column. But after a while, from some reason or other, the coal benches at the Manayunk works were started again, and only a portion of the supply for the district was made by the Lowe process, and during last month, we were credibly informed, about 15,000 feet *per week* was made by them, the rest being made from coal.

While in the first glory of a new start, functionaries and savans from all over the world were invited to rest themselves for a while from the fatigue of viewing the Centennial Exhibition, by going to Manayunk to see "The Light of the World." Finally, a full, searching investigation was asked for, and a committee composed of professors of unquestioned integrity and ability were asked to scientifically examine and report upon the matter. Mr. Dwight says that their contract with the gas trust is shown to be fulfilled by their report. We should be very glad to see that report, but as yet have been unable to obtain it.

Why is it kept back? Is it that the report is adverse to the process, although the managers may have done all that their contract called for? If the Lowe people had such a report unqualifiedly in favor of their process, we should have been

very glad to have published it, and we even think it would have found its way into some daily, or other paper, without being kept back for us to have the honor of first giving it to the world. Is the report kept back for the purpose of letting anybody down easy? Whatever this report may be, there seems one thing certain that there is more danger that the process is going out, than that it is going to burn up in Manayunk.

Other towns, to the number of about a dozen, are about to try the new gas. What the result will be therein remains to be seen. Evidently the managers are satisfied; it remains for a few years to show how the stockholders and consumers will view the matter. Not having had practical experience in the manufacture of illuminating gas by this process, we can only speak theoretically as to what its results ought to be; and in this connection we would say that all the water gas processes have the same object, the only difference being in the methods adopted to arrive at the results.

The first thing with all of them is to decompose steam by means of incandescent carbon; the result of this is a gas composed principally of hydrogen and carbonic oxide, in nearly equal proportions. This gas, having no illuminating power, has no merchantable value for lighting purposes, and some form of hydrocarbon is added to make it an illuminating gas. Petroleum, or some of its products, supply, in a convenient form, this demand, and consequently the water gas, or mixture of hydrogen and carbonic oxide, is carburetted by adding the petroleum in some way or other, and the naphtha vapors are fixed by a subsequent heat. The result is then an illuminating gas which is offered to the public containing about 33 per cent. of carbonic oxide, which, if inhaled, is a blood poison of a very active nature. If the gas is burned the products of combustion do not materially differ from those of coal gas; but if a leak of gas occurs there is danger of loss of life or serious injury to any one breathing it, owing to the 33 per cent. of carbonic oxide which the gas contains as sent out from the works. We do not honestly deem this a public benefit, and must say that such gas, if allowed to escape in any considerable quantity, would be seriously detrimental to public health, the opinion of the distinguished chemical adviser of the Milk Dealers Association to the contrary notwithstanding. If any one doubts this let him watch the laborers making connections with the street mains containing this gas, and he will see enough to convince him.

Theoretically it takes about 16 lbs. of pure carbon to convert enough steam into hydrogen and carbonic oxide to make 1,000 feet of this mixture, and 24 lbs. of water to make the steam.

The best experimental results that have been obtained have required about 90 lbs. pure carbon for the conversion of water into steam, and the decomposition of the latter into hydrogen and carbonic oxide. It is to be borne in mind that both the making and the decomposition of the steam should be taken into account in figuring first cost.

The practical results obtained in this country in making the hydrogen and carbonic oxide gas from steam and carbon have varied, according to the best information at our command, from 160 to 260 lbs. of carbon for every 1000 feet of water gas. Taking the average of these at 210 lbs. of carbon per 1000 feet of gas, would give a yield of about 11000 feet of hydrogen and carbonic oxide, to each ton of carbon. To this must be added 5 or 6 gallons of petroleum, per thousand, to give it the high illuminating power claimed for it, and the fuel for fixing the naphtha vapors. If waste heat is used it makes no difference, for fuel has to be used to make it. Of course the amount of petroleum used depends upon the illuminating power required.

From this can be calculated the large margin for greater cheapness in the holder. Some good practical men have figured at this, and they do not see this margin, even when a large margin in another direction has been placed in plain sight.

How consumers view the gas is a question about which there will always be a difference of opinion; but that there has always been more or less dissatisfaction on their part wherever oil has been used, cannot be denied. Sometimes they complain of smoked ceilings, sometimes of a varying quality of the light, and sometimes one thing and sometimes another; but always there seems to be a difficulty in getting uniform results at all times, and constant watchfulness and anxiety to the gas maker, and dissatisfaction on the part of the consumer is the result. If we are wrong in our conclusions in this matter, we shall be ready to admit it when convinced. If the managers of the Lowe process are satisfied with the success they have attained, other people ought to be, and, so far as its projectors are personally concerned, we are very glad if they have been able to make millions in it. Still, owing to the poisonous properties of the gas itself, the want of uniformity in the light obtained, and to the additional fact that we cannot see where the cheapness comes in, we shall not be surprised if the older gas companies generally do not adopt it, and neither do we believe that they will go out of the business of making illuminating gas, simply because of the advent of these schemes. Water gas is no new thing, as the Patent Office records for over fifty years will testify. On May 15th, 1824, an English patent was granted for "admitting steam into a decomposing chamber, among ignited coal or coke, alone or mixed with tar or oil," for the manufacture of gas. From that time to this innumerable efforts, and constant large expenditures, have been made to develop some form or other of water gas. Taking the relative conditions of coal gas manufacture in 1824 and 1877 we do not hesitate to assert that much greater progress, and scientific attainment, have been shown in making coal gas, than in the development of water gas.

The gas now made in New York under the Tessie du Motay process, although sufficiently brilliant and comparatively free from smoke, is subject to all the objections that can be urged against any gas of which one-third is carbonic oxide. This was the reason for throwing out and prohibiting by law, after a careful and scientific investigation, the similar water gas made under the Kirkham patents from the Hotel des Invalides, about twenty years ago.

That some sufficiently cheap method may yet be discovered of generating hydrogen without the poisonous accompanyment of carbonic oxide, we do not deny. And when that time comes, a new phase will be put on the water gas question. But that point has never yet been reached.

A MERITED COMPLIMENT FOR LONG AND FAITHFUL SERVICE.

Those of our readers who are personally acquainted with Mr. Edward Jones, Superintendent of the South Boston Gas-Light Company, will be pleased to read in another column the recognition which the directors of his company have extended to him, in the form of a reminder of the flight of time.

We should be gratified to oftener record similar occurances for faithfulness and ability, and sincerely hope that in cases where companies have well-tried and faithful servants, they will not deem it necessary to wait for the expiration of a quarter of a century before expression is given to their appreciation of true worth.

Mr. Jones has had a long and varied experience in gas matters, and is, we believe, well worthy the compliment paid him.

The New Political Gas Combination in Brooklyn.

There are now five gas companies in operation in the Western District of this city, known respectively as the Brooklyn, the Citizens', the Nassau, the People's and the Metropolitan. There is one company in the Eastern District known as the Williamsburgh Gas Light Company. The aggregate capital invested in these six companies cannot fall short of between eight and ten millions of dollars. Three of the largest companies have obtained, on the average, a life extending beyond a generation of men. It follows, as a consequence, that their stock is widely diffused, and that much of it is owned by widows and orphans who have inherited it. It is too, safe to say that five-sixths of all the capital invested in local gas stock is the property of citizens of Brooklyn. It needs no argument to convince any business citizen that a blow struck at an investment of this extent and character must disastrously imperil widespread private interests, and in doing so demoralize and injure, more or less, the aggregate business prosperity of an entire community. A conflagration in Brooklyn which should destroy five or ten million dollars' worth of our property would be a terrible blow at this city, and in the widespread loss which would follow, it might fairly be regarded as a national misfortune. We can readily conceive of public interests so important that, in view of them, a community would be justified in overlooking even private and vested rights. If it could be shown, for instance, that the Brooklyn Gas companies were making monstrous gains from their exactions on gas consumers, the representatives of the city would be entirely justified in taking steps for the relief of the public, although in doing so it might be easy to show that a citizen who invested his money in gas stock, in good faith, would lose a great part of it, or that even the widow and the fatherless, who relied upon the dividends on the gas stock they had inherited, should be left entirely destitute of income. Private interests in such cases must give way to the general interest, just as in case of a conflagration, a citizens property, apparently remote from its effects, may be blown up and destroyed, in view of the general danger, and to secure the general safety. But what will be thought of men who for selfish and sinister ends strike at vested interests, impair the value of their neighbor's property, and bring sorrow and despair to households depending on the income from such property for their means of living? How much in such a case as this does the raider on private rights and private investments differ from the midnight incendiary who, in order, it may be, to swindle an insurance company, exposes the property and the lives of his neighbors to destruction?

The relation which the *Eagle* has always borne to the gas companies of this city must be as well understood in this community as anything which has ever concerned it can be. We have resisted them when we thought their profits were exorbitant, and where no other recourse was left to us

we have urged opposition against them, and not unfrequently the *Eagle's* support was the chief support the opposition had. Grown up with this community, interested in one way or another with every public interest in it, and holding always to the general good as against any special interest, it is the *Eagle's* duty to defend the vested rights of citizens, while it has always held that the intelligent self interest of our local corporations made their interest and that of the public the same. We have thought and maintained steadily for years that the directors of the old Brooklyn gas companies were pursuing a short sighted policy in surrounding their business with any mystery whatever, or in so conducting it that secrecy, either as to their business or their profits, was an essential element of fair and honorable success. We have maintained always that gas consumers would be content to allow the gas companies a fair and even a generous return on their investments, and when, in years past, those returns were known to be unfair and excessive, and gas stock went up many times its par value, we tried to convince those in interest that in provoking just complaint on the part of gas consumers they were providing for their own ultimate loss and discomfiture. Finally, nature itself seemed to come to the relief of the customers of the gas companies. The earth suddenly yielded up from its bosom an abundance of oil, and the inventive genius of our people soon found means to render oil a reasonably safe and reasonably good substitute for gas. Hard times was on the side of the use of oil, but the ill feeling existing between the companies and their patrons presented a still stronger inducement, in the desire of the consumers "to get square" at last with corporation they had come to regard as at once insolent, overbearing and exacting. We believe that if, at the time oil come to be offered as a substitute for gas, our gas consumers and the gas companies had been on good terms, there would not have been one gas meter returned to the gas companies for the score which have been sent back.

We are not now dealing with the past, but with the situation as it presents itself to-day. There are, as we have said, five gas companies in the Western District of Brooklyn. We have taken pains to get at the selling rates of the stock of these companies, with the following result—the rates quoted being on the par value of one hundred dollars per share:

People's Gas Company.....	35 to 40
Metropolitan.....	80 to 85
Nassau.....	85 to 90
Citizens'.....	85 to 90
Brooklyn.....	150 to 160

Does anybody believe that, in view of these figures, it is proposed, in good faith, to try to establish another gas company in Brooklyn? If at the present rates charged for gas the stock of the People's Company, for instance, is selling for thirty-five or forty cents on the dollar, would any man outside of a lunatic asylum ever dream of starting an opposition to the People's Company, with the stipulation that the rates charged for gas shall be less than at present. Does any body believe that such public benefactors as James Jourdan have any money to risk in such an enterprise? The existing gas companies must retain their present customers, in the face of any opposition, or get out of existence at once. Is it conceivable that capitalists are going to risk three million dollars in trying the experiment of driving them out? Does Mayor Schroeder honestly think so? Whether he knows it or not, his announcement, yesterday, of his warm approval of Jourdan's enterprise has reduced the personal estate of his fellow citizens—invested in gas stock—over eight hundred thousand dollars, while it throws a cloud over nearly the million dollars' worth of property held mainly by Brooklyn people. In return, what advantage is promised to the public? In his "puff" of Jourdan's enterprise the Mayor assures us that Jourdan and his associates propose to sell gas at a rate twenty per cent. less than is charged at present. The Mayor knows that the rate charged for gas has very little to do with gas bills. The companies could charge half their present rates, and collect the me amount of money, by resorting to unfair dealing which no gas meter would disclose. But we are assured that the quality of the Jourdan gas will be as good as that we are using at present. Who is to determine? How can such a point be determined night after night? We must rely, after all, on the existence of a spirit of fair dealing on the part of the gas companies. Can we rely upon obtaining fair dealing only from Jourdan and his associates? In view of all the facts, would the *Eagle* do its duty if it did not warn the public against a scheme engineered by scheming politicians? By yesterday's move Brooklyn gas stocks were "beared" at least ten per cent. If next week the political gas men should cause it to be announced that they had not found their enterprise feasible, gas stocks would go up again, probably ten per cent. Is it right that any man, or set of men, should have the power of "kiting" the property of others in this way? Mayor Schroeder, is it not right, and if you should live to be a very old man, and should devote your life to it, you could not serve one-tenth as many of your fellow-citizens as you yesterday used your official power to injure. Jourdan's gas company will never be established, but his power for mischief does not depend on the fact of whether it is or not. —*Brooklyn Eagle, June* 5, 1877.

Industrial Education.

A score of reasons, any one of which is sufficient, could be given for expressing an earnest hope that the interest which is being awakened in industrial education, will result in action which will lay the foundation for a system of instruction in the industrial arts. Every intelligent person cannot fail to see the importance of such a system of education in this country, where so much depends upon the variety and excellence of the products of her manufactories. Indeed, when we come to consider the points of contact this matter has with every interest, and the effect it will have upon the general prosperity, no subject can scarcely be conceived which is of so deep interest to all classes, capitalist and laborer alike.

Of course there will not be wanting those who will ridicule the proposition to provide for a system of instruction in the industrial arts, but it will be well for such to understand that industrial education is not an untried theory. Industrial education has been tested in Great Britain, France, Germany and Austria. Indeed, in part of those countries it has become a part of the public educational system, and by all of the above it has been deemed so essential that schools of instruction have been established in connection with every branch of manufacturing industry. In fact, in every country of Europe which now takes a prominent position in the production of the results of skilled labor, the government recognizes not only the wisdom, but the necessity of such schools. Ten or fifteen years ago Austria was not classed among the nations which could compete with others of Europe either in the variety or excellence of its products of skilled labor. Within a few years the Government has given its attention to the establishment of schools for instruction in the mechanical arts. From the inception of that policy until the present time Austria has made marvelous progress in the development of its industries requiring skilled labor. The statesmen of France, who for many years have jealously watched and protected the industries of that country, have long encouraged a system of instructing the young by which that country has always had the most skillful workmen in every department of industry requiring skill and taste.

Industrial education, therefore, is not a theory simply, but a practical and successful means of supplying a nation with the essential element of success in the creation of wealth. It is so far an essential that the adoption of some method of instruction or the refusal to do so, decides the future to be one of prosperity and progress or the opposite for our manufacturing interests. We cannot hope to maintain a leading position among manufacturing communities, indeed cannot reach such a position, if we neglect to take the means which other nations avail themselves of to secure skillful, experienced and intelligent workmen. We can trust much to Yankee perseverance and shrewdness, but the production of the highest works of skilled labor must have an education that nature cannot bring. In a great many trades the Yankee may well conclude that he can turn himself to most any of them, but in a wider and higher field of skilled industry which becomes a source of national wealth, the nation whose "workmen pick up trades" will be distanced and classified with those which are always regarded as second-rate people because they can only produce raw materials.

Nor can we depend upon imported workmen. Thus far we have had to rely much upon them. They have done us excellent service, for which we should be grateful. Our pressing need is to utilize the thousands growing up in our midst. Much of the education which the State provides fails to give any good return. It is the education of helplessness. Children are taught, and well taught, in books, but it is all theoretical and in branches for the use of which there is no demand. Our educational system has a tendency to turn the young away from the producing classes and crowd them into the ranks of the non-producers. There are thousands of young men who can sell goods and keep books, but who can find no opportunity to earn a living at that business. The law schools, medical schools and colleges are graduating hundreds of young men these months, who will find that the supply is largely in excess of the demand.

What is needed is that a system of instruction in the prominent industries may be grafted upon our common school system, or become a branch of it, whereby the thousands that are now educated non-producers may become a vital force in creating wealth and prosperity. At the point where the State's system of education practically begins its instruction in helplessness, let the means of thorough instruction in the industrial arts be begun as that measure of self-ship which the commonwealth should afford to all her children.

More than ever the prosperity of this part of the Union in the future will depend upon the worth which its skill and industry shall be able to confer upon the raw material. Its greatness and the wealth and intelligence of its people will be measured by the diversity and excellence of its products of skilled labor. Every dollar which we add to the raw material is our dollar; but it must be the result of trained skill. Every new industry will be a new source of wealth; but diversity can only be available by being in the highest degree the result of experience and education.—*Boston Journal.*

Report of the Department of Public Works for the Quarter Ending December 31, 1876, Bureau of Lamps and Gas.

DEPARTMENT OF PUBLIC WORKS,
BUREAU OF LAMPS AND GAS,
NEW YORK, January 4, 1877.

Hon. Allan Campbell, Commissioner of Public Works:

[Continued from page 212.]

EXHIBIT "H."

GRANT TO THE HARLEM GAS-LIGHT COMPANY.

Resolved, That the consent of the Mayor, Alderman, and Commonalty of the City of New York is hereby given to "The Harlem Gas-Light Company" to lay conductors for conducting gas through the streets, avenues, lanes, alleys, and squares, in all that portion of the city lying north of the center line of Seventy-ninth street, for the purpose of supplying gas to public and private buildings, in consideration of the following articles being faithfully complied with:

FIRST—The said company shall not impede or interrupt public travel in the laying of such mains more than cannot possibly be avoided: and shall, after opening any street, lane, alley, or square, and depositing there mains, restore the same to as good condition as the same was before such opening, and be at all times subject to such restrictions, ordinances, and resolutions as the Common Council of said city may, from time to time, adopt, and under the control of the Street Department of said city.

SECOND—They shall furnish a supply of gas to all persons who may desire the same, and shall deprive no consumer of gas upon their refusal to pay, or for a dispute of the bill rendered, until they have served such disputant with the affadavit of their inspector as to the correctness of the register of their meter, and that all the gas for which said disputants are charged has actually passed through said meter.

THIRD.—The Mayor, Aldermen, and Commonalty of said city hereby reserve the right to purchase, at any time, from the said company, all the materials, pipes, fixtures, buildings, and all and singular all the personal and real property owned by said company, by paying to the said company the cost of the same, and ten per cent. over and above said cost.

FOURTH.—The permission herein granted is upon the express condition that said company shall proceed immediately, or within one year from the approval by the Mayor of the resolution, to lay their mains in the district as embraced in this grant, and supply, at least within two years from its passage, gas to be used by the corporate authorities or private consumers.

FIFTH.—The said company shall be exempt from taxation on their personal property for the period of three years from the organization of said corporation, pursuant to the power granted for this purpose by the eighteenth section of "an act to authorize the formation of gas light companies," passed by the Legislature of the State of New York, February 16, 1848.

SIXTH.—The Mayor, Aldermen, and Commonalty also to retain the right to revoke any and all permission which may be herein granted, upon satisfactory proof being afforded of a failure of the said "Harlem gas-light company," to comply with these conditions as herein expressed, or of any neglect to comply with any resolution or ordinance which may be hereafter adopted, and nothing herein contained shall be construed as giving any exclusive permission whatever to the said Harlem gas-light company.

Adopted by the Board of Aldermen, March 25, 1855.
Adopted by the Board of Councilmen, April 23, 1855.
Approved by the Mayor, April 25, 1855.
D. T. VALENTINE, Clerk of Common Council.
By John H. Chambers, Deputy.

EXHIBIT "I."

GRANT TO THE METROPOLITAN GAS-LIGHT COMPANY.

Resolved, That permission be and the same is hereby granted to the Metropolitan gas light company of the City of New York to lay pipes for conducting gas through the streets, avenues, lanes, alleys, and squares of the said city, for the period of thirty years, to be subject to the same restrictions as to the mode of laying down said conductors as apply to and govern the New York and Manhattan gas-light companies in that respect.

Adopted by the Board of Councilmen, June 9, 1858.
Adopted by the Board of Aldermen, June 10, 1858.
A message from his Honor, the Mayor, vetoing the same, was received by the Board of Councilmen, June 21, 1858.

By Board of Councilmen, December 20, 1858, taken up, considered and adopted, notwithstanding the objections of the Mayor thereto, two-thirds of all the members elected to said Board voting in favor thereof.

By Board of Aldermen, December 21, 1858, laid on the table.

By Board of Aldermen, December 22, 1858, taken up and adopted, notwithstanding the objections of the Mayor thereto, two-thirds of all the members elected to said Board voting in favor thereof; therefore, under the provisions of the Charter of 1857, the same became adopted.

D. T. VALENTINE, Clerk of Common Council.

EXHIBIT "J."

GRANT TO THE ANTHRACITE GAS-LIGHTING AND HEATING COMPANY.

Resolved, That there be, and hereby is granted to the Anthracite gas-lighting and heating company of New York, the right to lay pipes and mains for conducting gas for illuminating and heating, and other purposes, through the streets, avenues, lanes, alleys, squares, and other public places, in the City of New York, for a period of fifty years, as provided by the general manufacturing laws of the State of New York, the said conductors to be laid under the supervision of the Street Commissioner; the said company being required to restore the streets opened by them for laying such pipes to the same condition as before the said mains and pipes were laid.

Adopted by the Board of Councilmen, June 18, 1863.
Adopted by the Board of Aldermen, June 22, 1863.
By Board of Councilmen, July 6, 1863, received from his Honor, the Mayor, with his objections thereto.

By the Board of Councilmen, August 5, 1863, taken up and adopted, notwithstanding the objections of his Honor the Mayor.

By Board of Aldermen, September 17, 1863, taken up, and the above action of the Board of Councilmen concurred in, two thirds of all the members elected having voted in favor thereof; therefore, under the provisions of the amended charter the same became adopted.

D. T. VALENTINE, Clerk of Common Council.

EXHIBIT "K."

GRANT TO THE CITY GAS COMPANY OF NEW YORK.

Resolved, That there be and is hereby granted to the City gas company of New York, or their assignees, permission to manufacture, supply, and sell, and the right to lay pipes and mains for conveying gas, for illuminating and other purposes, through the streets, avennes, lanes, alleys, and squares and other public places in the City of New York, for a period of fifty years, from the date of the organization of said company, as provided by the general manufacturing laws of the State of New York; the said conductors to be laid by said company, or their assignees, under the supervision of the Street Commissioner; the said company being required to restore the streets opened by them for the purpose of laying such pipes and mains, to the same condition as before the said pipes and mains were laid.

Adopted by the Board of Aldermen, June 19, 1865.
Adopted by the Board of Councilmen, June 19, 1865.
Approved by the Mayor, June 20, 1865.
D. T. VALENTINE, Clerk of Common Council.

EXHIBIT "L."

GRANT TO THE NEW YORK MUTUAL GAS-LIGHT COMPANY.

Resolved, That permission be and the same is hereby given to the New York Mutual Gas-Light Company of the City of New York, to lay pipes for conducting gas through the streets, avenues, lanes, alleys, and squares in said city, for the period of thirty years, to be subject to the same restrictions as to the mode of laying down said conductors as apply to and govern the New York and Manhattan Gas-Light Company in that respect.

Adopted by the Board of Councilmen, April 27, 1868.
Adopted by the Board of Aldermen, April 27, 1868.
Approved by the Mayor, April 30, 1868.
JOS. SHANNON, Clerk of Common Council.
By F. J. TWOMEY, Deputy.

EXHIBIT "M."

GRANT TO ROBERT COMPBELL & CO. BY THE TOWN OF MORRISANIA.

Whereas, Messrs. Robert Campbell & Co., of the City of New York, have applied to the Board of Town Officers of the town of Morrisania, in the County of Westchester and State of New York, for the privilege to erect a gas works and put down pipes through the streets and highways of said town, for the purpose of supplying the same, and public and private houses of said town with gas; therefore,

Resolved, That, so far as the authority is vested in us, Messrs. Robert Campbell & Co., and such other citizens of said town as may be associated with them, have the privilege and right to lay or place under ground pipes in any and all streets, highways and public places of said town, for the purpose of supplying the citizens with gas, and to open trenches and ditches in the streets and highways for that purpose, provided they immediately restore the same to as good condition as they find them.

This privilege to be exclusive to them for the term of twenty years from the date hereof, and the said pipes may be extended from time to time during the said term.

This right and privilege is granted upon the express condition, that the said company, so to be formed, shall expend in said town, for the above named purpose, at least two thousand and five hundred dollars, within one year from the date hereof, and the further sum of five thousand dollars, within two years from the date hereof, and also, that they shall not charge more than four dollars per one thousand feet of gas; and when the daily consumption of gas shall amount to fifty thousand feet, it shall be reduced in price to three dollars and fifty cents per one thousand feet.

In witness whereof, we have hereunto officially set our hands this seventh day of March, one thousand eight hundred and fifty-nine.

Thomas Dodsworth, Town Clerk,
James A. Jenkins, J. Wessell, R. Henwood, } Commissioners of Highways.
William Cauldwell, Supervisor.
Silas D Gifford, A. P. Hawley, Jno. L. Burnett, Henry Sprally, } Justices of the Peace.

EXHIBIT "N."

GRANT TO ROBERT CAMPBELL & CO. BY THE TOWN OF WEST FARMS.

Whereas, Messrs. Robert Campbell & Co. of the City of New York, have applied to the Board of Town Officers of the town of West Farms, in the county of Westchester and State of New York, for the privilege to erect a gas works and put down pipes through the streets and highways of said town, for the purpose of supplying the same and public and private houses of said town with gas; therefore,

Resolved, That, so far as the authority is vested in us, Messrs. Robert Campbell & Co. and such other citizens of said town as may be associated with them have the privilege and right to lay, or place under ground, pipes in any and all streets, highways and public places of said town, for the purpose of supplying the citizens with gas; and to open trenches and

ditches in the streets and highways for that purpose, provided they immediately restore the same to as good condition as they find them.

This privilege to be exclusive to them for the term of twenty years from the date hereof; and the said pipes may be extended, from time to time, during said term.

This right and privilege is granted on this express condition, that the said company, so to be formed, shall expend in said town for the above-named purpose, at least three thousand dollars within two years from the date hereof, and three thousand dollars within two years thereafter, and also, that they shall not charge more than four dollars per one thousand feet of gas; and when the daily consumption of gas shall amount to fifty thousand feet, it shall be reduced in price to three dollars and fifty cents per one thousand feet.

In witness whereof, we have hereunto officially set our hands, this twenty-second day of November, one thousand eight hundred and fifty-nine.

John Bussing, Supervisor.
Samuel M. Purdy, William Gray, } Justices of the Peace.
Wm. G. Lent, John Corsa, Harvey Scofield, Charles Weeks, } Commissioners of Highways.

EXHIBIT "O."

ASSIGNMENT OF ROBERT CAMPBELL & CO. TO THE WESTCHESTER COUNTY GAS-LIGHT CO.

Whereas, The Board of Town Officers of the Town of Morrisania, and the Board of Town Officers of the town of West Farms, in the county of Westchester, did heretofore, in pursuance of a statute in such case made and approved, grant unto us, Robert Campbell & Co., the right and privilege to place under ground pipes in any and all streets and highways, and public places of said town, for the purpose of supplying the citizens with gas, and to open trenches and ditches in said streets and highways for that purpose, for the term of twenty years from the date of said grant, and, as an evidence thereof, did execute and deliver to us the annexed written instrument; and whereas, the Westchester County Gas-Light Company has been incorporated for the purpose of carrying into effect the objects for which said rights and privileges were granted as aforesaid:

Now, therefore, know all men by these presents, that we the said Robert Campbell & Co., in consideration of the sum of one dollar to us in hand paid by the said Westchester County Gas Light Company, have sold, and by these presents do grant, assign, transfer and set over unto the said Westchester County Gas-Light Company, its successors and assigns, all the rights and privileges granted to us by the said Boards of Town Officers, subject, nevertheless, to all the conditions and obligations contained in the said annexed instruments.

In witness whereof, we have hereunto subscribed our firm name, this first day of November, eighteen hundred and fifty-nine.

In presence of Silas D. Gifford.

Robert Campbell & Co.

EXHIBIT "P."

ASSIGNMENT OF THE WESTCHESTER GAS-LIGHT COMPANY TO THE SUBURBAN GAS-LIGHT COMPANY.

Whereas, The Board of Town Officers of the town of West Farms, in the county of Westchester, did hereunto, in pursuance of the statute in such case made and approved, grant unto Messrs. Robert Campbell & Co. the right and privilege to lay or place under ground pipes in any and all streets, highways, and public places of said town, for the purpose of supplying the citizens with gas, and to open trenches and ditches in said streets and highways for that purpose, for the term of twenty years from the date of said grant; and as an evidence thereof, did execute and deliver to said Messrs. Campbell & Co. the annexed written instrument; and whereas, the said Messrs. Campbell & Co., by an instrument in writing, bearing date November first, eighteen hundreed and fifty-nine, and which is also hereto annexed, did grant, assign, transfer and set over to the Westchester County Gas-Light Company, its successors and assigns, all the rights and privileges granted to them, the said Messrs. Robert Campbell & Co., by the said Board of Town Officers:

Now, therefore, know all men by these presents, that the said Westchester County Gas-Light Company, in consideration of the sum of one dollar to it paid by the Suburban Gas-Light Gompany, has sold, and by these presents doth grant, assign, transfer and set over unto the said Suburban Gas Light Company, all the rights and privileges which the Westchester County Gas-Light Company now has, or is entitled to by reason of the grant and assignment hereinbefore described; to have and to hold the same in that part of the town of West Farms lying north of the boundary line between the town of Morrisania and West Farms and a line in line therewith produced to the Bronx river, unto the said Suburban Gas-Light Company, its successors and assigns, during all the unexpired term of the twenty years aforesaid.

In witness whereof, the said Westchester County Gas Light Company hath caused its corporate seal to be hereunto affixed and this instrument to be subscribed by its President and Secretary, this eleventh day of February, in the year eighteen hundred and seventy-one.

Robert Campbell, President.
[SEAL.] Wm. R. Beal, Secretary.

EXHIBIT "Q."

CONTRACT OF THE WESTCHESTER COUNTY GAS-LIGHT COMPANY.

This agreement, made the 23d day of December, 1870, between the Board of Trustees of the town of Morrisania of the first part, and the Westchester County Gas-Light Company of the second part:

Witnesseth, That the said parties of the second part, for the consideration hereinafter mentioned, covenant and agree to light, with a good quality of coal gas, all the public lamps now erected or which shall hereafter be erected by competent authority in the said town of Morrisania, and to furnish the said gas, light and extinguish the said lamps and keep the lanterns clean during the term of ten years from the first day of January next hereafter; the burners in said lamps to be not less than three feet burners, and the same to be and remain lighted during the darkness caused by the withdrawal of the sun's light; the time for lighting and extinguishing to be as set down in the annexed printed table; and in consideration thereof the said parties of the first part promise and agree to pay the said party of the second part, for each and every lamp lighted as aforesaid, at the rate of fifty dollars per year during the first three years, forty-eight dollars per year during the fourth and fifth years of said term, and forty-five dollars per year during the last five years of said term; such payments to be made in cash or in the notes or certificates of said town, bearing interest and payable on or before the first day of March next after the issue thereof, as said parties of the first part shall elect.

And it is understood and agreed that for the consideration aforesaid the said parties of the second part shall furnish and replace, at their own cost and expense, all the glass, cocks, tubes, and burners which may become broken, worn or useless in said lamps or lanterns during said term and necessary to keep the same in good order and repair.

And it is further understood and agreed that said parties of the second part shall from time to time extend their pipes, called the mains of the company, in and along all the streets, avenues, and public places that have been properly graded of the said town, as and where street lamps shall hereafter be erected by competent authority; provided that the said parties of the second part shall not be compelled to expend in the laying and extending said mains as aforesaid, a sum exceeding $10,000 in any one year of said term.

In witness whereof, the said parties respectively caused their corporate seals to be hereunto affixed and this instrument subscribed, the parties of the first part by their President and Clerk, and the parties of the second part by their President and Secretary

Robert Campbell, President.
Wm. R. Beal, Secretary.
Hy. F. L. Bunting, President.
E. Ring, Clerk.

At a Special Term of the Supreme Court, held at the Court house in the City and County of New York, on the first Monday of April, A. D. 1875.

Present—Hon. George C. Barrett, Justice.

In the matter of the application of the Westchester County Gas-Light Company for an order authorizing it to change its corporate name.

On reading and filing the petition of the Westchester County Gas-Light Company, praying that it may be authorized to assume the name of the Central Gas-Light Company of New York City, and the verification of said petition by the President; and on reading and filing proofs of the publication of due notice of this application, pursuant to section 2 of chapter 322 of the Laws of 1870, and this Court being satisfied by said petition so verified that there is no reasonable objection to said corporation changing its name:

Now, on motion of Silas D. Gifford, of counsel for the said petitioner, it is ordered that the Westchester County Gas-Light Company be and hereby is authorized to assume the name of the Central Gas-Light Company of New York City, from and after the 15th day of May, 1875.

Endorsed—Filed and recorded 5th April, 1875, 11 h. 40 m.

To be continued.

Phosphorescent Mixtures.

The following colors can be obtained very readily:

Green—Hyposulphate of strontia, heated for fifteen minutes over a Berzelius lamp, and for five minutes over a blast lamp until it is fused, yields a yellowish-green color after exposure to sunlight. The same color can be obtained by taking equal parts of carbonate of strontia and *lac sulphuris*: heat gently for five minutes, then strongly for twenty-five minutes, over a Bunsen burner, and finally five minutes over a blast. This mixture is granular, and yields a fine green color, darker than the preceding.

Blue—Sulphate of strontia is prepared by precipitating with sulphuric acid from chloride of strontium; the precipitate is dried, heated in a current of hydrogen gas; then over a Bunsen burner for ten minutes, and for fifteen or twenty minutes over a blast lamp. The product sometimes yields a yellow phosphorescent light, and, when this is the case, it is necessary to give it another turn over the blast lamp.

Yellow—Sulphate of baryta six parts, charcoal one part, fused over a blast lamp, at first afforded no light, but, after twenty-four hours, gave an orange-yellow light. After the powders are prepared, they can be stirred into melted paraffine; and by means of a brush any pattern or design may be put upon glass. By protecting the glass in a frame, the powder will retain the property of glowing for a year or more. The use of the paraffine is to protect the powders from the action of moisture, and prevent decomposition. As a general rule, it is better to hermetically seal the mixtures in flat bottles, when they will retain their properties for years.—*Exchange.*

The Water Works at Newport, R. I.—Mr. Norman has begun again in earnest upon his water works. The engine house is to be built at once; it will be a brick structure, with a slate roof; the interior to be divided into two rooms, one 28x39 feet for an engine room, and the other 28x29 feet for boiler room. The building will be of fine architectural proportions, and after designs by Dudley Newton. Mr Norman has a large force at work upon the embankment, and will set the dredging machine at work at once. The main pipes from the pond to connect with those previously put down are being laid, and the whole business of introducing water is being driven with all possible despatch.—*Newport Mercury.*

Correspondence

[Correspondents, in all cases, should sign their communications with their names and address in full—not for publication, unless desired, but as a guarantee of good faith.—Ed.

The Lowe Process.

87 Astor House,
New York, May 24, 1871.

Mr. Editor; Allow me space for a few frank words regarding the Lowe process and the policy of its managers. They set out nearly four years ago, determined to demonstrate beyond a reasonable cavil, the superiority of the system for the production of a brilliant illuminating gas at a reduced cost, and they have never flinched from any test, chemical, mechanical, of financial, which would help to reach a truthful solution of the problem. As a result its entire strength stands proven in twelve different towns and cities without a single stoppage, except in the case of Utica, where the accidental burning of the wooden building temporarily interfered with its operations.

New works will shortly distribute gas in Lancaster, Pa., and a very extensive plant is going into Baltimore with large capacity, thirty inch mains, and every facility for a permanent business, which is already guaranteed by the subscription of some ten thousand consumers to the new gas, and the number steadily increasing. The gentlemen conducting that enterprise are well known sagacious business men, not likely to embark large capital in operations not well investigated or likely to prove unprofitable, and we accept their endorsement of the Lowe process as quite satisfactory. In Indianapolis the system is also to go into operation, despite the many ingenious impediments raised by those who have heretofore controlled the business in that city, and the long struggle over the bond question.

I notice you took the ground, in your first article on this question, that the Council ought to insist on this guaranty that genuine competition would be secured, but the suggestion loses much of its public spirit, since written evidence is in our possession that it originated with the attorney of the old company. And it seems to me you hurt the morality of your argument in your second notice, when finding that the contest is ended in the delivery of the bond for a reduced amount (though the like of it never was demanded from any existing company), and that the new company is likely to go forward, you suggest that its stockholders should make a better profit by forfeiting the same and combining with the old company for higher prices. Does this proposition come from the same source?

What you say about the opposition principle has some truth and much fallacy about it. I admit there never has been, and is not likely to be, any "genuine competition" growing out of the manufacture of gas from coal by the old time retort method, but insist that unless the managers of this great industry adopt promptly a more progressive policy, they must inevitably encounter the rivalry of improved processes.

Speaking for my associates I will say, that at the outset we were so unsophisticated as to suppose that if our process developed merit it would attract the attention, and receive the fair consideration of gas men, who being already in the business, we considered entitled to participate in the benefits. We did not then understand that any and all processes must be gauged by their relation to great interests in certain coal mines, and as a consequence we bore the indifference and discourtesy of various companies with a serenity which now seems quite juvenile. Finding that even the Gas-Light Associations, so called scientific bodies, are so under the influence of this interior interest, that any attempt to criticise the venerable retort system is immediately frowned down, we were compelled at last to go into the business ourselves, and we now take pleasure in announcing that we are so far satisfied with our progress, that we confidently expect to continue in it permanently.

The consumers appear to be in thorough earnest on the subject of better light for less money, and are quite indifferent to the Westmoreland coal market. We have their sympathy and believe they are not likely to listen to protests from old companies, or ingenious "mortuary statistics" expressly prepared for the New England brethren, any more than they will spend much time in reading the fulminations of the obscure individual (under the stately title of Philadelphia Gas Association) whose services as draughtsman we declined last year, and who has erected a monument to his own incapacity, in the shape of a mammouth holder (that won't hold) in Boston.

Having rested our success from the beginning on the intrinsic merit of the process, and that having been fully established, we do not fear these things.

You are so kind as to notify us, and the world at large, in a most delicate manner, that Rumor has it, that the process will shortly be dispensed with at Manayunk, though you do not mention upon what grounds.

Our operations at that place have been briefly as follows: We agreed to erect at our own personal cost, and did so erect, works on the premises of the Gas Trust of Philadelphia, at Manayunk. We started the same August 4th last, and have run uninterruptedly to the present time, making as high as 250,000 feet per day, showing our ability to make a much larger quantity any and every day if required.

Except for the temporary annoyance heretofore acknowledged to be inevitable to the use of old and foul pipes, no trouble has been experienced, and numerous testimonials from the mill-owners and residents are on file showing the satisfactory character of the gas sent out. In the contract with the authorities four points were left to the determination of Messrs. Rogers & Stevens of Pennsylvania University and Girard College, and the results of their tests are in our possession, and show the terms of the contract to be *completely fulfilled on every point involved.*

These tests are further confirmed by the examination of other experts. Under these circumstances, although, of course, Madam Rumor is always respectable authority, and your prediction may very likely prove true, we do not see how the process can be condemned, and await the decision with the utmost composure. A consciousness of duty done makes one very brave you know.

As an incident to this subject it may be stated that the President of the Philadelphia Gas Trust illustrates his faith in the Lowe process by the erection of works in Harrisburgh, which have recently gone into competition with the old coal system.

We shall do what we can to make a legitimate business of gas-making, and while we respect the solicitude of those who dread a competition never before experienced, shall certainly expect our share of the business.

Respectfully,

George S. Dwight.

Philadelphia, June 7, 1877.

Mr. Editor: I see by your issue of the 2nd June that you have an article on the Lowe process, which you say is "unavoidably crowded out." Now, Mr. Editor, I sent you sometime since a communication which I thought was quite interesting, and would be read with much interest and great profit by those who are interested in the manufacture of illuminating gas on this same subject (Lowe process), and I must ask how much longer this communication is to be "crowded out," or whether you have consigned it to that common receptacle of all things lost on earth, the waste paper basket.

Coal Gas.

[In accordance with the above request we have hunted up the article referred to, and here it is.—Ed.

Philadelphia, April 11, 1877.

Mr Editor: I send you the following testimony of parties who have used the gas made by the Lowe process at the Manayunk station in this city. The testimony was obtained by personal interviews with the parties themselves, and I give it to you as near verbatim as possible, thinking it might be of interest to your readers.

John G. Mortis, 4329 Main street, grocer, said: Last fall I had a great deal of trouble with the gas, sometimes it was so poor that with all the burners lit, I could not see to transact business. The burners would become so clogged that I had to substitute new ones for those that had been in use while burning the regular coal gas. The Lowe Gas Company would send a man to remove the burner and clean out the pipe, which sometimes was full all the way back to the cock. During all the winter it gave more or less trouble; more trouble than the old coal gas did during the last five or six years I have been here. In fact I never knew any trouble about gas except to pay the bills, until this water or oil gas was introduced. Sometimes it would go out during the night, making it unsafe to go to bed with it burning. One night it would be bright, while, perhaps, the next night we would be nearly in total darkness. I signed a petition for the removal of this bad gas, which was also signed by about seventy of our business men. If necessary could have got nearly everybody in town to sign: only one person refused. I afterwards signed a certificate testifying to the gas being good, with this proviso, that at present it was doing tolerable, but not as good as the old gas, which was afterwards made use of by this oil gas company in a way that I never intended, and I authorize you to contradict it, having never approved of it, except in a qualified manner. The mill complained of clogging up and inferior light. The oil gas company had two men constantly going around and cleaning burners and overhauling the gas lamps; they had to use a wire to clean out the pipes in the lamp posts. The company said that the tarry substance around the burners and in the cocks, was that deposited by the coal gas, and which the oil gas had loosened and forced out. A. W. Givins's store and house had new pipes throughout, yet the tar would come out just the same as in my store. The coal gas I could turn down very low, but the oil gas had to have a good head, or it would pop out. The street lamps had to be cleaned out every day or so or else they would go out at night; even then the light was very inferior. They promised that our bills would not be so large, but find no decrease; in fact, rather an increase, as we had to put on a large burner. They say it can be made for thirty-five cents per thousand, and at I. & J. Dobson's carpet mill they use it, but then they have a steam pipe to keep the gas pipe warm, so that the tar can run back to the drips.

John Toran, 4307 Main street, grocer, said: One of our burners is so filled up with a tarry substance that we cannot light it. Last fall I had to take off the burners every few days and clean them with coal oil to get off a tarry deposit. Sometimes the gas would go out when it should not; it was not safe to leave it alone. We were told that the burners were not right so that we got new ones, but then after a time, were just as bad as the old ones. We had more trouble during this winter with this oil gas than during five or six years with the coal gas, which, in fact, never gave us any trouble whatever. The street lamps are decidedly poor, giving next to no light.

J. McNansee, Milliner, said: I have trouble with stopping up of the pipes; the burners had to be cleaned up every little bit, say every two weeks; did not have this trouble with the coal gas. The gas at present is much better and cannot complain. (It was ascertained that the amount of oil or water gas being made at this time, and for a month or more previous was thirteen to twenty thousand feet per diem, which wrs about *fifteen per cent. of the whole, the rest being coal gas*, eighty-four per cent.)

Samuel W. Brown, druggist, said: The gas is very good at present; much better than during the winter, when we had that Lowe gas. With coal gas I never had any trouble whatever, but with the Lowe gas the burners were always clogging up, getting so full that we could scrape a buttery substance off with a knife. The fixtures would be full all the way from the bur-

ner to the cock with this thick tarry substance; the quality was very irregular—some nights very good, others very bad. The bills were about the same as for coal gas, while the trouble and light was a nuisance to everybody. I. & J. Dobson have a man who does nothing but attend to the gas pipes, which are so connected to the steam pipes as to blow out the tar every week or so. Cannot be used for cooking as it smokes and smells too much; don't want any of it at any price.

Alexander W. Given, 4250 Main st., paper hanger, said; A decided humbug. The pipes in my house and store are new, yet they stop up just like my neighbors; have been without gas for a week at a time, on this account. The gas company put on larger burners, consequently I have to pay a larger gas bill. The smoke was so bad that it ruined the hangings in my windows; the smell was awful, resembling a cesspool nearer than anything else. The cocks would clog up so that I could not turn them; there is one of them now (pointing to a cock that was bent at nearly right angles and twisted); sometimes had to warm them so as to get the gas through. Some nights the gas was so bad I could not see to read the newspapers.

J. R. Kipple, oyster saloon, 4361 Main street, said: Don't like the gas at all. Stops up the fixtures, smokes and gives bad light; every 5 or 6 days had to clean out the burners; did this myself, but the oil gas company would send a man to do it if I notified them. Had to take out the plugs in the cocks and clean the fixtures with a wire. The company took off the regular burners, and put large burners on in their place. Have burned gas for seventeen years, and never had any trouble until this new gas was introduced. My bills were much larger than usual, yet my light was so poor that five burners, in a room sixteen feet square, would not give enough light. Was compelled to buy candles. Everything got clogged up; fixtures, pipes, meters, and even the mains (the main referred to was part of the oil gas works which he saw opened to clean out the obstruction himself.) While in the restaurant, one of the company's men came for the meter, which had got out of order, and he remarked that it was stopped with tar.

Mr. Smith, Main st., builder, said: I signed a petition for the new gas on the understanding that my bills would not be as much. Did not find this to be the fact. I have had more trouble with the gas last winter, than I had for the last twenty years with the coal gas. Did not know what trouble was until the new gas was introduced. Frequently the burners would choke up, so that I had to take them off and clean them. The cocks would also become so clogged with a tarry substance, that they could not be turned with the fingers.

Mr. Allen, of Allen & Morris. Main street, cloth mills, said: The oil gas is a perfect humbug The quality is irregular, sometimes tolerable good, at other times bad. Would so stop up the burners that we had to have new burners put on. The stop-cocks would stick, and could only be loosened by force or by heat. Some nights the gas was so bad that we could not see at all. In my private house it has ruined the wall paper with smoke. I never had any trouble with the gas as made before this humbug was introduced, although using it for about twenty-five years. At present, April 11, 1877, it is good enough, but positively the Lowe gas won't do for the mill

Hugh P. Donald, foreman of Allen & Morris's mills, said: The gas was very poor. Stopped up the burners so that they had to be removed, and either cleaned or new ones put on. At night it annoyed us very much, some parts of the mill being dark, while other parts were but little better. The old gas never gave us any trouble whatever.

Elliot Leach, boss weaver at Allen & Morris's mills, said: The gas gave us trouble continually, stopping up not only the burners, but also the pipes with a tarry substance. Had to clean the pipes with a wire. We could not get enough light, the hands complaining of it; also the smell. It would keep a man all the ime going around looking after the burners and pipes, cleaning them and putting on new ones. Could not recommend it in the mill

Geo. W. Davis, of Campbell mills, said: We have about 1200 burners, but as we never had enough gas, cannot judge of the Lowe gas. But what we did have clogged up the burners and did not give satisfaction. Could not recommend it; neither could I condemn it, because we could not get a full supply of any gas. In my house (which had new burners and pipes) the gas did not give satisfaction: it would give sufficient light in some parts of the house, while in others it was not so good. The burners became clogged up, and the gas was not satisfactory.

Sergent Stinson, of the police, said: The street lamps did not give as good light as before the introduction of the new gas. The gas was frequently found out, during the nights, which was not the case with coal gas. It is the same in the police-station as in private dwellings; the burners and fixtures stop up continually as also at my house. At present it is much better than during the last fall and winter.

The foregoing minutes contain the answers to questions propounded to various gas consumers of Manayunk, in reference to the Lowe gas used by them during the fall of 1876 and winter of 1877, and express their voluntary and candid opinions as to its economical merits and value. The persons were not specially selected, neither were any of their opinions, answers or experience omitted. COAL GAS.

The Manufacture of Ammonia Salts from Ammoniacal Gas Liquor.

The following method of preparing ammonia salts from the gas house waters, is particularly interesting, since it produces a pure carbonate of soda, and, at the same time, is both cheaper and easier than the Solvay soda process, and it involves no waste products. Dr. G. T. Gerlach, of Kalk, near Deutz, is the inventor of the process.

If sal ammoniac is the salt we wish to obtain, chloride of sodium (table salt) is of course the source of the chlorine, and the process resembles in some respects that of Solvay. The crude ammoniacal liquors are first distilled and yield carbonate of ammonia; in this is dissolved a quantity of common salt, equivalent to that of the carbonate of ammonia present. This solution has a gravity of 1·22. Into it is passed a current of carbonic acid gas, as long as any bicarbonate of soda is precipitated. Some sulphuretted hydrogen is thus expelled, which had passed over in the form of sulphide of ammonia. The precipitated bicarbonate of soda is removed and dried; and on heating, enough carbonic acid is expelled to serve for the next operation, mono-carbonate of soda remaining. The liquid contains chloride of ammonia with some undecomposed carbonate of ammonia, with chloride of sodium and a little dissolved bicarbonate of soda. The carbonate of ammonia is recovered by distillation, the sal ammoniac and salt by crystallization after concentration. Instead of being decomposed by lime, as in Soluay's process, the sal ammoniac is sent to the market. If, however, it is desired to make *aqua ammonia*, some of this mother liquor is treated with lime and distilled.

If sulphate of ammonia is the product desired, the sulphate of soda is employed to decompose the carbonate of ammonia. Either crystallized Glauber salt is dissolved in the concentrated solution of carbonate of ammonia, or the anhydrous sulphate (salt cake), obtained in the manufacture of nitric or hydrochloric acid, is dissolved in a less concentrated solution of the ammonia salt. Equivalent proportions of the salts are employed, and the solution has a specific gravity of 1·3. Carbonic acid is passed into this solution until the bicarbonate of soda ceases to be precipitated. The latter salt is removed and dried as before. In solution are sulphate of ammonia, undecomposed carbonate of ammonia and sulphate of soda, with a trace of dissolved bicarbonate of soda. The carbonate of ammonia is recovered by distillation, the other salts by concentration and crystillization.

When nitrate of ammonia *is* the product required the carbonate of ammonia is decomposed by means of Chili saltpetre, or nitrate of soda. The reactions are the same as before, the chief products being nitrate of ammonia and bicarbonate of soda.

It is evident that the use of chloride, sulphate, and nitrate of soda, instead of the corresponding acids, must be both cheaper and more convenient, while the simultaneous production of soda ash still further increases the profits. The separation of the salts which remain in solution is an easy matter, owing to their unequal solubility. In the first case we had common salt and sal ammoniac; on concentrating to a certain point the former will crystallize out of the boiling solution, and after this is removed the solution is allowed to cool, when the latter will crystallize out. Sulphates of ammonia and soda crystallize from solution as a double salt containing two equivalents of water of crystallization. But on evaporating a solution of these salts to a certain point, the anhydrous Glauber salt will separate, and sulphate of ammonia will remain in solution. The anhydrous Glauber salt is not pure, and is employed for decomposing a fresh quantity of carbonate of ammonia. In separating table salt from Glauber salts at a boiling heat, care must be taken not to burn the salts, and on a large scale steam heat should be employed.—*Scientific American.*

Gas-Making at Hamilton, Scotland.

Any improvement on the present process of gas-making, by which a gas of a higher illuminating power can be manufactured from a cheaper description of material, is one which is worthy of notice, especially by those municipal bodies which have now the gas supply of the towns over which they preside in their own hands.

A problem of this nature has for about sixteen months past been under the consideration of the Gas Committee of the Hamilton Town Council—at which thriving burgh the gas works have been managed by the Corporation for about nine years past—and to all appearance is in a fair way of being solved in a satisfactory manner. As ordinarily manufactured the gaseous vapors, after leaving the retorts, pass through the ascension and dip-pipes into the hydraulic main, thence into the condensers or coolers, consisting of a series of vertical pipes which constitute a well-known feature of every gas works. From these the gas again proceeds in turn through the exhauster, scrubber or washer, and purifiers, into the gasometer.

Under the method now in operation at Hamilton, the vertical pipe condensers are superseded bp a patent condensing analyser, which has the effect of utilising the naphthas and other light-giving constituents in the tars, which, under the old process, escaped for the most part into the tar-well, and were thus lost to the gasmaker. The analyser, which can best be described by comparing it to a boiler set upon one of its ends, is thirty-six feet high by nine feet in diameter, and is constructed of sheet-iron plates firmly rivetted together. In its lower compartment is a coil of two-inch pipes, through which steam is passed: while above these, at regular intervals, is a series of trays, twelve in number, so arranged that the gas in turn passes round the outside edge of the one and through a fine gauze netting placed around an aperture sixteen inches in diameter in the center of the other. The gas, tar, and ammoniacal liquor, as it passes out of the retorts into the hydraulic main, has a temperature of about 180° Fahr., but by the time it reaches the analyser this is reduced to 150°. Instead of being allowed to cool further, however, the gaseous vapors and tars are subjected in the lower chamber of the analyser to a heat varying, according to the material used, from 214 to 230° Fahr. This volatilises all the light-giving properties in the tars, and the hydrocarbon vapor is carried forward by the gas as it travels along its successive upward stages. The gas as it ascends gradually cools, its temperature at the top of the analyser being only 70°, while at the same time the heavier hydro-carbons which it cannot any longer

retain become liquefied, and descend in a dripping shower over the edges of the trays to the steam-pipe chamber, where they are again vaporized. The ascending gas of course passes through this shower of hydro-carbon liquid, and should it happen from any cause to be of inferior quality, it thereby gets enriched. The gas is carried from the top of the analyser, by an outside pipe, to the washer, and afterwards subjected to the usual processes of purification. It has to be remarked that the tar which flows from the analyser, when subjected to a heat of 330°, shows only faint traces of having within it any illuminating constituents.

Further, it has to be noticed that the new method seems to be better adapted to purify the gas from ammoniacal liquid with which it is mixed in its initial stages. When drawn off under the old process the specific gravity of this liquid was something like 3° Twaddell (a recognised test among gasmakers), while under the new process its specific gravity is raised to 6°, thereby increasing to that extent its marketable value. In point of fact, the ammonia is all but taken out of the gas in the washer, whereas formerly a considerable quantity passed into the lime purifiers, where it was deposited, but from which it was irrecoverable. The quantity of lime, therefore, which is now used in the final stage of purification is greatly decreased.

In a highly favorable report which was drawn up by the Committee of the West of Scotland Gas Managers, who subjected the invention to a series of severe tests, this point was specially noticed—the committee remarking that "An examination of the gases as they entered the purifiers showed that those from the analyser process were almost perfectly denuded of suspended tarry matter, indeed they were almost colorless; whereas the gases condensed by the ordinary method had a slight smoky appearance, and contained a considerable quantity of suspended tarry matter." It is claimed on behalf of the analyser that by using it a gas of a high illuminating power can be obtained from a cheaper material than that generally required to charge the retorts, and this seems borne out by the results of the Hamilton trial. Since the Corporation took over the works shale has invariably been used as an enricher, first-class cannel coal being employed for the same purpose in many other places.

In the year ending March 1876, in every ten tons of gas-making material used the quantities were four of shale, say, at 9s. per ton, one of second-class cannel coal at 23s., and five of third-class cannel coal at 7s.; while in the year ending March last the quantities were $2\frac{3}{4}$ of shale, 7 of third-class parrot, and $\frac{1}{4}$ of second-class parrot—the relative cost of materials being thus reduced from about 9s. 4d. to 7s. 10d. per ton, while the gas has been raised in illuminating power from 28 to 31 candles. The presence of a greater quantity of hydro-carbons in the gas gives to the flame emitted from an ordinary burner a peculiar brilliancy, and it may be important also to state that it is quite free, at this standard, from any smoke.

The price of gas in Hamilton is 4s. 2d. per 1000 cubic feet, but we understand that the Corporation do not charge themselves anything for the gas used in lighting the streets. Were that done, it is believed it could be sold to consumers at about 3s. 9d. per 1000 cubic feet. An analyser, we believe, suitable for a work producing 30,000,000 cubic feet of gas per annum, costs about £300, and there does not seem to be any difficulties in the way of adapting it to existing works. The present analyser at Hamilton was, we believe, put up by the patentees on trial, but it having given so much satisfaction, the Corporrtion do not mean to dispense with its services. Both Mr. Tainsh, the convener of the Gas Committee, and Mr. Dunlop, the manager, speak in high terms of its capabilities. The analyser is also likely to be introduced at the new works now in process of construction at Coatbridge. Dr. Wallace, the Glasgow City Analyst, has, we believe, been engaged for a short time past in testing the gas made both by the new and old processes, and his report is expected to be published in a few days.—*The Scotsman (Edinburgh) May 4.*

Gas-Light Intelligence.

United States.

The Hanlon Improved Process.—We are informed that the Hanlon Improved Process (petroleum) has been put in by the Lexington (Mass.) Gas-Light Co.

Cheap Gas for Brooklyn.—At a regular meeting of the Brooklyn Board of Aldrrmen yesterday afternoon, a lengthy communication was received from Mayor Schroeder, transmitting the bond of the Mutnal Gas-Light Company, as approved by him. The company is required, under a penalty of $50,000, to furnish within one year from the 28th of May, 1877, gas at a reduction of twenty-five per cent. below the price now charged by the old companies to consumers, and at a still greater reduction to the city. The company is to expend at least $200,000 during the year. It is required to extend its pipes for the sapply of gas annually, until the grant shall reach the whole city? Owners of buildings will not be charged for their meters.—*N. Y. Herald, June 5.*

British West Indies.

New Gas Works.—We learn from Jamaica, British West Indies, that a gas works has been erected by an English company, at a cost of £20,000, and that the city was illuminated on the 10th ultimo. Several handsome devices were exhibited on the public square and other prominent points.

Great Britain.

Meeting of West of Scotland Association.—It was arranged that the fifth annual meeting of the West of Scotland Association of Gas Managers shall be held at Linlithgow on Thursday, May 1st, under the presidency of Mr. Levi Monk, of Lanark. An excellent programme of business has been provided by the committee of the Association. Besides a number of formal business items, there will be the president's address; report by a sub-committee on Messrs. Aitken and Young's patent process of gas manufacture, and remarks on that process as carried out at Hamilton Gas Works; paper by Mr. D. B. Peebles, on "The Application of Electricity to Peebles's System of Controlling the Action of Gas Governors, and its Adaptation for giving Flash Signals for Lighthouses, Railway Signals," &c.; discussion on the same; discussion on Mr. Monk's paper on "Twenty-Candle Gas as the National Standard Illuminating power for Scotlannd;" and discussions which members may introduce on subjects connected with the manufacture, distribution, or consumption of coal gas.—*London Journal Gas Lighting.*

Explosion at the Manchester Corporation Gas-Works.—Shortly after ten o'clock on Sunday morning last an explosion, attended with serious results, occurred at the Manchester Corporation Gas-Works, Medlock street, Gaythorn. The particulars given below are obtained from a statement furnished to the police. About half past-nine o'clock the retort foreman discovered that the gas was escaping from a main running east to north of the No. 1 retort-house. With the assistance of other workmen, he set to work to remedy the defect, and, with the view of preventing any casuality, ordered that the charge of gas usually delivered at ten o'clock be delayed—an order which, it is to be presumed, was attended to. Whilst the men were repairing the defect in the main, the gas filled the aperture between the surface of the pipes and the covering, the latter consisting of a layer of bricks, and an upper one of flags, and the gas becoming ignited at the conjunction of the 2-feet main with the 4-feet main, which communicates between the retorts and the exhausters, the result was a terrific explosion. The flags and other material were projected along the whole length of the retort-house, and several workmen who were thrown down by the force of the explosion were injured. One man, named White, had his right ankle, left shin, and left thigh fractured; he sustained also a deep wound on the forehead, and a wound at the back. It is not expected that he will recover. Considerable alarm was caused in the neighborhood by the explosion.—*Manchester (Eng.) Guardian.*

Chemical and Scientific Repertory.

Waterproof Composition.—The Chinese make a waterproofing composition which renders straw baskets, wooden or cardboard boxes entirely waterproof, of blood deprived of its fibrine, 3 parts; lime, 4 parts, and a little alum. They call it "Schioicao."—*Western Manufacturer.*

To Clean Marble Mantels.—Marble mantels that have become badly discolored by smoke may be made perfectly clean by the application of benzine. Put it on liberally, then rub off with a clean flannel. If one application does not do it effectually, a second will. Never apply soap to marble, it takes off the polish; but grease spots may be removed by the application of powdered magnesia.—*Ibid.*

A Cement for Amber.—A cement for joining amber is made of a solution of hard copal in pure ether. The carefully cleaned surfaces of the fracture, coated with the solution, should be pressed together and retained in contact by means of a string wound around the object, or in some other suitable way. Perform the operation as rapidly as possible, as the evaporation of the ether impairs the adhesiveness of the cement. Make all the arrangements for compressing the object before laying on the cement. A few days are required for the complete hardening of the cement.—*Ibid.*

Temperature of the Sea.—Through the observations of the Challenger explorations of 1868–70 it was ascertained that the temperature of the sea at 500 fathoms was 29° instead of 35, as generally believed. It is now known that in the South Atlantic the water over the bottom is generally as low as 32°, while in the North Atlantic the temperature rarely falls below 35°. This problem of the low degree of water in the tropical areas where warm water might be expected and a higher degree in the polar region, where one might look for a colder temperature, is certainly a curious one.—*Iron Age.*

The Economy of Electrical Illumination.—According to the estimate of Messrs. Siemens and Halske, of Berlin, the cost of electrical illumination is but one-fifth of that of gas. It is to be observed, however, that the extreme intensity of the light ill adapts it for illuminating factories where delicate work is made, although it is most satisfactory in such industrial establishments as machine shops, foundries, etc. The consideration of the increased danger of fire in the electric light is, in the end, an economical consideration, that frequently decides in favor of gas light.—*Polytechnic Review.*

On the Purification of Brown Sulphate of Ammonia.

By A. Esilman.

In the purification of coal gas from sulphur and ammonia there are obtained, as is well known, several products formerly valueless, but now utilized as cheap materials for the manufacture of vitriol and sulphate of ammonia. The principal purifying material is sulphate of protoxide, or hydrated peroxide of iron mixed with a quantity of sawdust, and when this mixture has been properly employed in the purifiers, it leaves the gas-works containing 30 to 60 per cent. of sulphur, and sulphate and sulphocyanide of ammonium (mainly the former) in quantity sometimes reaching 20 or 25 per cent. After washing out the ammoniacal salts the residue is burned in peculiarly constructed furnaces for the manufacture of vitrol.

The sulphate of ammonia obtained from the washings by crystillization is of a more or less dark red-brown color, owing to the accidental presence of soluble ferric salts in small quantity, and as it contains all the sulphocyanide originally present in the oxide, it is of very inferior value in the market. An easy

and inexpensive method of converting it into ordinary sulphate was some time ago devised at the works with which I am connected for a neighboring firm, and has been worked by them ever since. A supply of gas-liquor is necessary, and the "conversion" is carried on simultaneously with the manufacture of ordinary sulphate. The mode of procedure is as follows:—

A quantity of brown sulphate about equal in weight to the acid, which will be only half the ordinary charge, is put into the empty "blower," and then the acid (not less than 110° Tw.) is run in. On turning on steam from the ammonia boilers an effervescent action sets in, due to the escape of sulphocyanogen and its products of decomposition, and the result is its speedy volatilization. This point can be easily shown to be reached by taking out a small portion of the liquor, diluting with cold water, and adding a little solution of ferric chloride or sulphate. No reddening indicates its absence. The contents of the blower are now finished off in the usual way. The only precautions necessary are to start with an empty blower, and avoid the addition of water or mother-liquors until the decomposition is completed. Of course the relative proportions of brown sulphate and acid may be varied according to circumstances When there is a very abundant supply of gas liquor, more acid and less sulphate may be employed. It is advisable to have a hood over the blower connected with a draught pipe, so as to carry away the deleterious vapors evolved. The cost of the treatment is merely nominal.

That the quantity of sulphocyanide in some samples of commercial sulphate of ammonia is large, may be inferred from the fact that a lot of London sulphate when distilled with slaked lime in excess and the vapors conducted into acid yielded 25 to 27 cwts. white sulphate of ammonia per ton; this apparent paradox being explained by the yield of ammonia produced from the nitrogen of the sulphocyanogen as well as that ready formed. In the absence of soluble oxide of iron such sulphate of ammonia may not show the slightest abnormal color.

However tempting the presence of cyanogen compounds in products from such exhaustless sources may be to the scientific manufacturer, the present insignificant demand for sulphocyanide salts acts as a complete barrier to their utilization, and the conversion of sulphocyanide of potassium into the corresponding ferrocyanide by fusion with iron is not such an easy matter on the large scale as laboratory experiments would indicate. Possibly sulphocyanide of barium would give a better result in the desulphurising process, as cyanide of barium is more stable than cyanide of potassium, and is readily converted into potash salt by sulphate of potash.—*Chemical News.*

Improvement in the Adjustment of Gas Holders.

Since the introduction of gas lighting, chains were used to hang the gas-holders for small works, and were applied at the same time to balance the pressure from the holder as it ascended and descended in water. This was found suitable for gas-holders from 10 to 34 feet in diameter; larger sizes, being buoyant, required no chains, but rather weights to press them down; smaller sizes were then of less consequence.

Though never very exact, the chains were considered good enough for all practical purposes, and are still used as formerly,

About twenty years ago when the Sales of Gas Act was proposed to be introduced, more perfect measuring apparatus was required, and efforts were made to improve gas-holders as well as meters. Among other improvements the cycloid or eccentric wheel arrangement had been introduced for adjusting the pressure of gas-holders, and was considered ingenious and satisfactory. The adjustment was effected by a weight hung over a second wheel with an eccentric curved groove, so attached that the greatest leverage was exerted when the holder reached its highest point, diminishing again as the wheel returned in proportion to the descent of the holder, and its consequent depth of immersion. Finding that the curved cycloid deranged the centre of gravity of the wheel Mr, F, W. Hartley, of London, placed a second cycloid exactly opposite to the first, and so restored the balance.

This plan, being by the highest authorities at that time considered the best, was adopted by the government, and all our standards have been so constructed. The government model stands, deposited at the Exchequer, by which all other of our standards have as yet been verified, are very fine instruments, being gotten up without regard to expe se, and reported by the Astronomer Royal to be as perfect as human skill could make them..

Identical copies of these models were presented to the Corporation of London, Edinburgh and Dublin, designed to verify the working standards used by England, Scotland and Ireland, respectively. These are all hung by very fine chains, but these being light, the cycloid arrangement completes the equipoise. All our working standards are hung by cords; these, in constant use, are liable to break, and what is still more objectionable, the frequent slipping of the cords deranges the cycloid, and necessitates constant readjustment.

On several new copies being required for the city of Edinburgh it was resolved that these objections should be removed; and, like the originals, it was specified that the new copies should be hung up with chains fixed to the wheel, having each a cycloid to the provisional requirements.

On having my attention afterwards directed to the weight of chain required, but having no idea of dispensing with the cycloid, I commenced a few experiments, and was gradually led to the conclusion that, if small gas-holders were made of one equal sheet, and the chains half the weight of the water displaced, then no cycloid would be required. On expressing my conviction to several practical men, I found that, though all admitted the possibility, great doubts were entertained as to the practicability of adjusting by the chains alone, all assuring me that they had been tried and abandoned, and the cycloid substituted as superior. To persuade me that the matter was perfectly understood, I was shown a copy of a rule written about 50 years ago, as follows:—"For a gas-holder, say ten feet deep, ten feet of the chain should weigh one-half of the difference of the weight of the holder, when weighed in and out of the water."

Not being satisfied with the grounds stated for abandoning the chain adjustment, I procured several very sensitive pressure-gauges and other apparatus, and continued my experiments, comparing the working of those experiments fitted with the cycloid arrangement, as contrasted with the chain adjustment, and am now satisfied that the latter has been abandoned without due consideration.

Chains can now be procured well made to any weight, and the brass scales placed on the sides of each gas-holder can be made the proper thickness to complete the exact balance.

There are several modes of carrying out this adjustment, to one or two of which it may be proper to allude. A cord, or a band of thin steel or ather material, may be used to hang the gas-holder and balance-weight; and a chain or band of proper weight, may be hung over a wheel with turned groove (substituted for the cycloid). In this case the chain or band, by its own weight, passing over the wheel adjusts the pressure; but, like the cycloid, it should be fixed to the wheel, to prevent disarrangement. Another way and better, is to have the usual wheel with suitable groove, to contain a thin steel band, bearing the holder and weight. Over this groove a chain or band is hung, which by its weight adjusts the pressure. This double band should be attached by a pin in the center, to prevent the heavier from slipping; but neither of these should be attached to the wheel, as slipping of the band over the wheel will be advantageous, and promote the forward movement of the friction rollers.

Of all the modes I have tried, however, I prefer the simple chain alone, and consider it better than the cycloid arrangement; because, in my opinion, it is simpler and cheaper, more easily computed, more easily adjusted, less liable to derangement, it alleviates the objectionable friction movement, and it is more substantial and exact.—*R. Ferris, Edinburgh, Scotland.*

Electro-Chemical Illumination.

MM. Gauduin and Gramme have recently conducted a series of experiments in order to determine the effects of various foreign substances, combined with carbon pencils, upon the production of electric light. The materials introduced into the pencils were phosphate of lime (from bones), chloride of calcium, borate of lime, silicate of lime, pure precipitated silex, magnesia, borate of magnesia, phosphate of magnesia, alumnium, and silicate of alumnium. The proportions were calculated so as to obtain 5 per cent. of oxide after the baking of the pencils. The latter were submitted to the action of a current, always in the same direction, furnished by a Gramme electric machine of sufficient power to form an electric arch of from 0·4 to 0·6 inch in length. The negative pencil being placed below, the following results were observed:

1. The complete decomposition of phosphide of lime. Under the triple influence of electrolytic action, calorific action, and the reducing action of the carbon, the reduced calcium accumulated on the negative pencil, and burned (in contact with the air) with a red dish flame. The lime and phosphoric acid produced abundant smoke. The light obtained, measured by the photometer, was double that yielded by pencils of similar dimensions made from gas retort residue.

2. Chloride of calcium and borate and silicate of lime were also decomposed; but the boracic and silicac acids seemed to be volatilized through the action of the current. Less light was obtained in this case than with the phosphate of lime.

3 Silex rendered the pencils worse conductors, diminished the light, and melted and volatilized without becoming decomposed.

4. Magnesia and borate and phosphate of magnesia were decomposed. Magnesium in vapor went to the negative pencil, and burned, in contact with the air, with a white flame. Magnesia and boracic and phosphoric acids escaped in the state of smoke. The augmentation of the light was less than with the lime salts.

5. Aluminum and silicate of aluminum were decomposed only with a very strong current and large electric arch; but under these circumstances the decomposition was quite manifest, and the aluminum vapor could be seen leaving the negative pole, as from a gas jet, burning with a dull bluish flame.

The authors state that, considering that the flame and smoke which accompanied these electro-chemical lights would prove a great obstacle to their utilization they continued their experiments no further. They point out, however, that the introduction of foreign bodies into pure carbon pencils is an excellent mode of studying the effect of electricity upon such bodies, which is susceptible of many very interesting applications.—*Scientific American.*

Prices for Digging Coals.—Braidwood, Ill.; wants $1.05 per ton, had been receiving 95 cts., and it was proposed to reduce to 80 cts.

Erie, Colorado; 70 cents per ton.

On the Monongahela 3 cents per bushel.

Pekin, Ill.; gas coal vein 26 in., 4 cents per bushel.

At Pomery, Ohio, 1¾ cents per bushel.

At New Straitsville, Ohio, 40 cents per ton.

At Pardoe, Pa., 65 cents per ton.

On the Kanawha, W. Va., 2½ cents per bushel.

Stuebenville, Ohio, 2½ cents per bushel.

In the Cumberland mines, Md., 50 cents per ton.

Beacon, Iowa, 3 cents per bushel.

Keystone, Somerset county, Penn., 50 cts. per ton.

Sewickly, Pa., 2½ cents per bushel.

Clearfield, Pa., 40 cents per ton.

Coal Trade Journal.

THE AMERICAN GAS LIGHT JOURNAL AND CHEMICAL REPERTORY

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SATURDAY, JUNE 16, 1877.

The Game of Whist.

[The following verses, which will interest every lover of the pastime it describes, were printed in the newspapers several years ago, and are now republished by request.)

If you the modern game of whist would know,
From this great principle its precepts flow;
Treat your own hand as to your partner's joined,
And play, not one alone, but both combined.

Your first lead makes your partner understand
What is the chief component of your hand;
And hence there is necessity the strongest
That your first lead be from your suit that's longest.

In this, with ace and king, lead king, then ace:
With king and queen, king also has first place;
With ace, queen, knave, lead ace, and then the queen;
With ace, four small ones, ace should first be seen;
With queen, knave, ten, you let the queen precede;
In other cases you the lowest lead.

Ere you return your friend's, your own suit play;
But trumps you must return without delay.

When you return your partner's lead, take pains
To lead him back the best your hand contains,
If you received not more than three at first;
If you had more, you may return the worst.
But if you hold the master-card, you're bound
In most cases to play it second round.

Whene'er you want a lead, tis seldom wrong
To lead up to the weak or through the strong.

In second hand your lowest should be played,
Unless you mean trump-signal to be made;
Or, if you've king and queen, or ace and king,
Then one of these will be the proper thing.

Mind well the rules for trumps—you'll often need them:
When you hold five, 'tis always right to lead them;
Or, if the lead won't come in time to you,
Then signal to your partner so to do.

Watch also for your partner's trump-request,
To which, with less than four, play out your best.

To lead through honors turned up is bad play,
Unless you want the trump-suit cleared away.
When second hand a doubtful trick you see,
Don't trump it, if you hold more trumps than three;
But, having three or less, trump fearlessly.
When weak in trumps yourself, don't force your friend,
But always force the adverse strong trump-hand.

For sequences, stern custom has decreed
The lowest you must play, if you don't lead.

When you discard, weak suits you ought to choose
For strong ones are too valuable to lose.

A Handsome Acknowledgment.

Superintendent Jones of the South Boston Gas Light Company has been remembered by the directors of the company in a substantial and gratifying manner, the occasion being the close of twenty-five years' service with the company. At the regular meeting of the directors, Thursday, the following complimentary vote was passed, and a handsomely engrossed copy presented to Mr. Jones.

Whereas, Before another meeting of the directors of the South Boston Gas Light Company, our superintendent, Edward Jones, Esq., will have completed his twenty-fifth year in the service of this corporation.

Resolved, That we desire to place upon the records our appreciation of his ability and fidelity, and the esteem in which he is held by the community at South Boston.

Resolved, That the clock purchased by our president with a plate upon it duly inscribed as the gift of the corporation, be sent to Mr. Jones on the first day of June, now next ensuing, that being the date on which Mr. Jones will complete his twenty-fifth year as superintendent.

Resolved, That we offer to Mr. Jones our best wishes for the future, for himself and his family.

BOSTON, May 31, 1877.

Signed by the President and Board of Directors.

The clock is a beautiful black marble, gold mounted mantel clock, surmounted with a card receiver, the plate bearing the inscription:

Edward Jones,
from the
South Boston Gas Light Company,
June, 1877.

This handsome acknowledgement of Mr. Jones' worth by his associates will be a pleasure for him to remember during the remainder of his life. It is noteworthy, also, that thirty-one years ago Mr. Jones was the recipient of a handsome gold watch, presented by the Boston Gas Light Company, after the completion of twelve of his fourteen years' service with that company.

Mr. Jones is one of the oldest gas engineers in the country, having been in the business since he was twelve and a half years old, at which age he entered the employ of the Boston Gas Company, remaining with them until 1848. For the four years next succeeding he was with Messrs. Blake and Darracott, constructing gas works in Lawrence, Providence, Lowell, Worcester, Cambridge and South Boston. At the time Mr. Jones began his connection with the business there were but three gas works in the United States, viz.: at Boston, Baltimore and New York, and the amount of gas made in Boston was but 25,000 feet per day. Now there are between seven and eight hundred companies in the country. Thus it will be seen that Mr Jones has grown up in the business, and that he must consequently have a pretty thorough knowledge pertaining to the manufacture of gas, which with his well-known probity and social disposition fully justifies the acknowledgement made in the testimonial.—*Exchange.*

Relative Economy of Gas and Hydraulic Engines.

When we come to consider the relative economy of gas and water-pressure from an accumulator for lifting and hoisting, the result in towns is entirely in favor of the former, water being from 500 to 1000 per cent. dearer than gas. Taking the figures in the paper, we have the rate for water power at ½d. for 1 ton lifted 40 feet high. Now there are many gas engines working at the rate of ½d. for 7 tons lifted 40 feet high. Or taking the other figures given, we have for water power a mean of 1.22 pence for 100 foot-tons. In a gas engine developing one horse power at the brake at a guaranteed consumption of one pennyworth of gas an hour with gas at 4s. per 1000 feet, after allowing for interest and depreciation, and taking the efficiency of the power through the crab or hoist at 0.65, we have 100 foot-tons at a cost of 0.17 pence with gas against 1.22 pence with water, hence we find that water power, taking the figures of its own advocates, is 1200 per cent. dearer than gas.

This should be sufficient to show that for the general run of users of small motive power, there is nothing to be gained in economy in having pressure mains laid down for working hydraulic engines, when gas can be used instead.

When we come to water engines worked off the town mains or from cisterns (without the assistance of an accumulator), where the water is supplied on the intermittent system, as in London, we shall find the balance of economy still more in favor of gas.

For want of a better rule, we have made the following for finding the cost of water power. As water is usually supplied at so much per 1000 gallons, and as the cost will vary inversely as the pressure, we have: Cost in pence per theoretical horse power per hour =

$$\frac{\text{price in pence of 1000 gallons} \times 85}{\text{pressure in pounds per sq. in.}}$$

If we take .85 as the efficiency of the engine we shall have

$$\text{the } \frac{\text{price} \times 100}{\text{pressure}} = \text{cost in pence per actual horse power per hour,}$$

and easy rule to remember and apply. But as there is a great waste in water engines when running light, especially in those which act as their own meters and register as much water used when doing no useful work as when exerting their full power, the efficiency should rather be taken at .50 than .85, when the coefficient will be 170. In London, we cannot reckon upon having over 40 lbs. pressure in the mains, which I find to be the highest daily pressure in the main at the level of the floor of the vaults under St. Paul's (where there is a water engine worked direct from the main), and which may be taken as the pressure in the city generally. Taking the price of the New River water in the city at 15 pence per 1000 gallons, the pressure at 40 lbs. and the efficiency at .50, we have for the cost of one horse power per hour in the city

$$\frac{15 \times 170}{40} = 63\tfrac{3}{4} \text{ pence;}$$

40 lbs., is, however, too high a pressure to assume for private consumers, as the New River Water Company does not sell water to be used direct from the main, except in a few cases for Government and other public buildings.

Coming now to the cost of using gas with the best description of gas engines, which are extensively used, we have as a rule: cost per horse power per hour =

$$\frac{\text{price in pence per 1000 ft.}}{45}$$

Now, taking the price at 3s. 9d. per 1000 feet we have 1d. as the cost of one horse power per hour, showing that water engines fed from the town supply in the city of London cost in working about 6300 per cent. more than gas.

It is, therefore, not surprising that it cost 3s. an hour to do work with a turbine in London which can be better done for ½d. an hour by gas.

As all water companies are not so fortunate as the New River Company in getting 1s. 3d. per 1000 gallons, we must alter the result above found to suit the price of water in the various towns. An average price is 6d. per 1000 gallons. This still makes water power over 2000 per cent. dearer than gas, taking the available pressure at 40 lbs. and the efficiency of the engine at .50.

For those who prefer water power for hoisting and other work, by far the cheapest way of using the water is to have a tank holding a few thousand gallons, and an accumulator which can be most cheaply pumped up by a gas engine.—*Engineering.*

A Steel Wire Hawser, 150 fathoms long and 1¼ tons in weight, has been supplied to the iron-clad frigate Alexandra. When coiled it occupies a space 4½ feet by 4½ feet. A hemp hawser would be double the weight and occupy six times the space.—*Iron Age.*

Gases Met With in Coal Mines.

At the South Yorkshire Underground Colliery Viewers and Deputies Association meeting, held at Barnsley, on Saturday, a very interesting paper on the above subject was read by Mr. P. Hall, of the Oaks Colliery, certified manager. There was a large attendance, the association numbering upwards of 300 members. Mr. Hall commenced by stating that as chemistry was the science which made known to them the properties of all bodies, simple or compound, solid or liquid, it was necessary that those engaged in the management of coal mines should be acquainted with the principles of that interesting science. In acquiring a knowledge of the properties of the atmosphere and the changes to which it was subject, as well as the laws relating to winds, dew, rain, etc., chemistry was their principal if it was not their only guide, as it was also an essential for a thorough acquaintance with the mineral kingdom. In all the singular and surprising changes which everywhere present themselves, the more closely they were examined the more would they admire the simple means by which they were accomplished, and the intelligence, design, and wisdom displayed in them. If they took the gases which they had to deal with they would find they were formed by the affinity which one body had for another, and the consequent union which took place between them. Atmospheric, or pure air, was the greatest of those compounds, and those present as officers of coal mines were morally and legally bound to produce it in its pure state for the benefit of those engaged in raising coal. Atmospheric air is computed to extend a distance of about 45 miles from the earth, and its gravity is such that a middle-sized man would be able to sustain a weight of about 14 tons, but such a weight would crush him to atoms were it not for the air contained in the body, the spring or elasticity of which counterbalanced the weight of the external air, and rendered the human body insensible to its pressure, more especially as the air was equally diffused over the entire frame. The weight of the atmosphere, therefore, so far from being an evil, was essential to their existence, hence the necessity of providing at all times in their collieries a plentiful supply of it.

The composition of atmospheric air was oxygen and nitrogen in the proportion of 21 of the former to 79 of the latter. Oxygen was one of the most important of the elementory bodies, and in its simple state was obtained only in the form of gas, but was found in most natural products—animal, vegetable, and mineral. Hydrogen, the other ingredient composing atmospheric air, is rather lighter than ordinary air, of which it constitutes nearly four-fifths, does not support combustion, nor is it combustible itself. It is, however, fatal to animal life. Light carburretted hydrogen—the fire-damp of their coal mines—consisted of one volume of the vapor of carbon and two volumes of hydrogen condensed by affinity into one volume, its specific gravity being 562, atmospheric air being as 1. Being lighter than ordinary air by nearly ½, it occupied the roofs and all the higher parts of their mines, and was also emitted from the fissures and minute pores of the coal in a highly compressed state. It was generally found in the greatest abundance near dykes and faults in the coal measures, and was most copiously given off from coal of a coking character than from that of an open, dry, and burning description. It is believed to have generated during the decomposition of the vegetable matter of which coal is composed, and from the hydrogen of the water and moisture. Mines which were shallow seldom gave off explosives in any dangerous quantities, having, no doubt, found means of escaping to the surface through the pores or crevices by which the water descended to the coal. As the fire-damp existed in a highly compressed state, being pent up by the counterpoising pressure of the atmosphere, any lightening of the atmospheric pressure, as indicated by a fall of the barometer, was a sure sign of an extra discharge of gas. Fire-damp, however, was not explosive until mixed with five times its volume of atmospheric air, and then the explosion was only feeble, whilst it ceased to be explosive when 14 times its bulk of atmospheric air was added to it. About 9-10ths the volume of air to 1 of fire-damp formed the most powerful explosive mixture, and in this condition when it comes in contact with a naked light it explodes with the rapidity and violence of gunpowder, producing the most fearful consequences. When a safety-lamp was brought in contact with the fire-damp the gas, as they would have observed, exploded inside the gauze without igniting the gas inside, thus ennabling the fire-trier to detect it in safety to himself.

The products of an explosion of fire-damp, commonly called after-damp, in which generally more lives were lost than in the explosion of gas in the first instance, consisted of 71 parts of free nitrogen, 9½ of carbonic acid, and 19 parts of steam, forming a most deadly gas, which when inhaled was fatal to life. Black-damp, or carbonic acid gas, was composed of carbon and oxygen, and its specific gravity, as compared with atmospheric air, was 1.54, or rather more. It readily diffuses itself among the atmospheric air, but when it accumulates in a solid stratum it rested on the floor of the mine, sometimes occupying a space of from 1 to 2 ft. in thickness. It was produced in coal mines from a number of causes, which were in constant operation—by human perspiration, the combustion of the lamps, explosions of gunpowder, etc.—and very frequently liberated from the coal measures. In some mines it was given off so rapidly from the newly-cut coal as to extinguish any light that came in contact with it. Carbonic acid gas was also often found in wells, cisterns, etc. and even in their own neighborhood many lives had been lost that might have been saved if it had been known that a few buckets of water would have removed all danger. Hydrogen having been mentioned as one of the principal mixtures in the composition of fire-damp, it may be said that it was only known in the form of gas, and was sometimes called inflammable air, and he considered very properly so. It was the lightest of all bodies that could be weighed, and was always found in the highest part of mines. It was one of the ingredients forming water, from which by a chemical process it could easily be procured. When pure, hydrogen gas possessed all the properties of common air. It did not support combustion, though it was by itself one of the most combustible of all bodies, for if a lighted candle came in contact with it the candle would be instantly extinguished, while the gas itself would be inflamed. It was not fit for respiration, but if oxygen was mixed with in the proportionate parts named in the composition of fire-damp it would instantly explode.

White-damp (carbonic oxide) was also composed of carbon and oxygen, containing 56.69 per cent. of oxygen and 43.31 of the other. It was a little lighter than atmospheric air, being in the proportion of .975 to 1. It was very deleterious in its nature, and unlike the black-damp, which would not support light, the workmen's lamps burnt with great clearness in a most deadly atmosphere of white-damp. That gas, however, was seldom met with in coal mines from natural causes, but was principally produced by blasting with gunpowder and from fires underground. A German writer of the 16th century relates how the miners in his day would frequently fall back from the ladder while in the act of ascending the shaft after the toils of the day, overcome by the deadly influence of the white-damp. The 204 persons killed in the Hartley explosion, and 109 in another similar catastrophe that took place at the Avondale Colliery, in Pennsylvania, were all destroyed by the white-damp. In mines in which gunpowder is extensively used to throw down the coal the workmen often suffer from the effects of the white-damp, causing giddiness and other unpleasant sensations, for the powder, containing 74.8 per cent. of saltpetre, 13.3 per cent of sulphur, and 11.9 per cent of charcoal, is converted by explosion into an equivalent of fifty per cent of fire-damp. Another inmate of the coal was sulphuretted hydrogen, which was generated in the old wastes and gobs that were shut off from the reach of the ventilating currents of air. It was a gas that had a very unpleasant smell, nearly resembling that of rotten eggs, and produced faintness and giddiness. It was composed of 94.15 of sulphur and 5.85 of hydrogen, and was a little heavier than common air. A lamp would burn in a mixture of the composition, although human life could not exist in it for any length of time. In concluding, Mr. Hall said the gases brought before the notice of those present only became dangerous and fatal elements where the ventilation was neglected, but where timely, necessary, and elaborate arrangements were applied for the production and maintenance of an abundance of fresh air to sweep such gases away as fast as they were generated the subterraneous workshops of the miners would be safe, healthy, and even pleasant, and the men would have no cause to complain of their presence. If all those present would make the composition of gases their study they would be the better able to deal with them. Recent legislation had to a certain extent done something towards their removal, and if they, as officers, would extend their knowledge in the direction indicated he believed they would have about heard the last of those terrible and lamentable explosions which had taken place in the mines from time to time. Information is now placed within the reach of every working man, showing him how he can grapple with the evils under which the collier has long suffered, owing to the pernicious and evil effects of an impure atmosphere, often rendering him a comparatively old and infirm man before the freshness of youth ought to have passed away. A cordial vote of thanks was unanimously passed to Mr. Hall for his very able and interesting paper.—*The Mining Journal.*

Binocular Vision Experiments.

BY FRANCIS E. NIPHER.

It is possible that the phenomena here described may have been observed before, but I have been unable to find any record of them.

1. Fold a sheet of writing paper into a tube about an inch in diameter. Look through the tube at some distant object with one eye, and toward the open hand with the other eye, the edge of the hand being in contact with the tube. The dissimular objects producing unlike images upon the retinæ, the sensations blend, and a hole will appear to be cut through the palm of the hand, through which the tube passes. That part of the tube between the eye and hand will appear to be transparent, as though the hand were seen through it.

This experiment is very old, but it seems not to have found its way into scientific literature.

2. Replace the hand by a sheet of unruled paper, upon which a drop of ink has been placed. By proper management, the ink blot may be made to appear within the tube, by so placing the paper that the hole, which is apparently cut through it, coincides with the blot. Ordinarily the blot with then appear opaque, the paper immediately around it, and apparently within the tube, being invisible. The blot appears as it were, suspended in space. By concentrating the attention strongly on objects seen through the tube, especially if they are strongly illuminated, the blot becomes more hazy, transparent, and may be even be made to disappear altogether. The mental effort necessary to do this cannot be maintained more than a few seconds, and the spot will reappear. If the effort to cause the spot to thus disappear be kept up, the attention being strained to its highest pitch, the blot will disappear and reappear at regular intervals of a few seconds, the absolute time depending upon the illumination. It seems as though the organs exerted become fatigued, and, relaxing for a few moments, refreshment sets in, which again renders possible the exertion necessary in causing the blot to disappear. It is possible that these experiments may be so made as to throw some light upon the conditions necessary in fixing the attention. Interesting exper-

iments may also be made by substituting a fragment of a plane mirror for the sheet of paper. Looking through a rather large tube at a distant object with the right eye, the reflected image of the left eye will appear staring up the tube, the adjoining parts of the head being invisible.

3. Substituting for the ink blot a small hole cut through the paper, the small hole can also be made to appear within the tube, distinguishing itself by its different illumination, the surrounding paper being invisible, unless attention be directed too strongly to the paper in which the hole is cut. The relative illumination of the small hole, and the space immediately around it, depends upon the relative illumination of objects upon which the tube is directed, and that of the sheet of paper exposed to the other eye.

4. Keeping the same arrangement, place at a distance of one foot from the end of the tube a sheet of paper so that objects beyond it are still visible; arrange matters so that it is visible to the eye looking through the tube, but not to the other, directed at the small hole in the paper sheet. This second sheet will now appear to be traversed by a hole the same in size as that cut through sheet No. 1.

Cutting a small hole in sheet No. 2, matters are easily arranged so that it appears within the hole which was before seen within the tube. These experiments may be utilized in showing the simultaneous accommodation of the two eyes.

5. Tubes of this kind, blackened on the inside, are very convenient in studying color sensations. Using two such tubes, look through one with the right eye, say, at red, through the other with the left eye at green paper, illuminated by the direct solar ray. The color sensations fade with marvelous quickness. Transferring both eyes to either color, say red, the eye fatigued by green sees the red greatly intensified, the effect being rendered the more striking by the simultaneous impressions received by the two eyes. Experiments in the combination of color sensations will readily suggest themselves.—*Scientific American.*

Something New in Cannon Manufacture.

Military circles throughout Europe have of late become much interested in a new process lately adopted for the manufacture of cannon by General Euchatius, Director of the Imperial Arsenal at Vienna. The name "steel bronze" has been given to the process, as though it was accomplished by the use of a new metal, which is not the case, for there is no steel about it. The metal employed is nothing more than ordinary bronze or gun metal, in general use. Its superior resisting qualities are due simply to the manner in which it is manipulated after being cast. It is well known that bronze guns, under the strain of repeated firing, enlarge without any corresponding alteration of the exterior, and thus soon become worthless. General Euchatius' plan to overcome this trouble is as follows: The gun is cast in the usual manner, hollow, and with a bore somewhat less in diameter than it is intended the finished gun shall have. A series of thirteen punches are then forced through the bore, each a little larger than the preceding one, whereby the bore is gradually enlarged, under a powerful pressure, while the metal it at the same time subjected to great friction, causing it to become extremely hard, and of a nature well suited for the subsequent rifling.

Twenty guns, thus prepared, have been tested in Austria during the past two years. The results obtained have been such that the Austrian government is now constructing two hundred batteries, or twelve hundred guns, at the rate of six batteries a week. A single gun so prepared has withstood 3,000 rounds without any perceptible deterioration; and others, even after being subjected to the severest tests—shells burst in their bores—appeared to lose nothing in point of accuracy of fire. In estimating the relative cost of these guns with those of other metals, the value of the bronze for remelting, after the gun has become worn out, must be taken into consideration. This done the first cost of the Euchatius cannon is placed at less than half that of a Krupp steel piece, and very much below that of a Whitworth compressed steel gun, which, at a rough estimate, is about twenty per cent. more expensive than Krupp's.—*Scientific Press.*

Destruction of Fish by Polluted Waters.—Our correspondent, "T. Filius," of Alleghany City, Pa., writes, under date of May 7th, recording an instance of destruction of fish by polluted water, quite serious in its character and extent. We quote:

"Last week the plug was drawn from a large tank of ammonia water at the gas works at Little Washington; the fluid ran slowly into Catfish Creek, killing quickly countless numbers of fish. One boy discovered thirteen under one board; the largest nine inches in length. As soon as the effect was ascertained a man was sent to have the water shut off, which was done. Only two feet had been drawn, while six times that amount remained in the tank. It is believed that every fish in Catfish Creek was killed, and all, or nearly all, in Chartier's Creek for half a mile below the mouth of Catfish.

The same thing was done a number of years ago, when two or three boys lost their lives, it is supposed by swimming in the impregnated water. Suit is to be entered immediately, we understand, by the Fish Commissioner of this city against the gas company. The streams in this country were stocked under his supervision. The gas company plead ignorance of the effects of ammonia water on fish. This may palliate their offense so far as the public sentiment goes, but will be no defense in the eyes of the law.—*Forest and Stream.*

Prices of Gas Coals.

Our quotations for the standard gas coals remain without material change.

Westmoreland	$5 50	$4.50)	at Baltimore.
Penn	5.50	4.50)	
Despard	5.35		
Marion	5.35		
Murphy Run	5.35		
Ches. and Ohio R.R. Caking Coal	5.40	4.25	at Richmond.
Block House	4.50	1.75)	Gold f. o. b. at Mines.
Glace Bay	4.25	1.60)	
International	4.25	1.75)	
Clover Hill	4.00		
Newcastle	4.25		
Cannelton Cannel	10.00		
Peytona	10.00		

Besides some small orders for Westmoreland and Penn coal, that have been taken, since our last issue we note a contract for 13,000 to 15,000 tons of Chesapeake and Ohio Railroad caking coal at $5.25, delivered at New York. In view of the uncertainty that exists as to the water freight from Richmond to New York, this price may be considered a very favorable one for the purchasers.

The quantity of American gas coal contracted for, to be delivered in New York and immediate vicinity, up to the present date, is estimated at not over one hundred thousand tons; as against three hundred thousand tons contracted for up to the same date in 1876. Reliable advices from Pittsburgh say that up to the present time no shipments of gas coal have been made East over the B. & O. RR. from the Youghiogheny districts. The failure of one of the large coal operators, noted elsewhere, may have had something to do with the total cessation of business from a district which has heretofore contributed largely to the New York and Eastern markets.

No arrivals of Newcastle coal at New York The receipts of Provincial coal at New York to date has been 6,201 tons from Cow Bay, Cape Breton, and 550 tons from Glace Bay, Cape Breton.

FAILURE OF THOMAS MOORE,

Mr. Thomas Moore, the well known gas coal operator, has filed a voluntary petition in bankruptcy in the U. S. District Court at Pittsburg; the liabilities aggregate nearly $700,000, about $450,000 of which is said to be amply secured—the balance is unsecured. Among the assets are 5,463 shares of the Youghiogheny Coal Hollow Coal Co., valued at $164,000. The future operations of this company will be governed somewhat by the disposition that may be made of this part of Mr. Moore's assets, representing as it does the majority of the stock of this coal company. The balance of the assets is in coal and iron properties, the value of which cannot be correctly estimated, but these must be seriously affected by the existing depression in that description of property.

Gas Stocks.

Quotations by W. B. Scott & Co., Bankers,

24 Pine Street, New York City.

June 16, 1877.

☞ All communications will receive particular attention

	Capital.	Par.	Bid.	Asked.
Gas. Co.'s of N. Y. City.				
Central, Westchester	466,000	50	90	95
Harlem	$1,850,000	50	100	105
Manhattan	4,000,000	50	190	195
Metropolitan	2,500,000	100	130	132
" Scrip	$1,000,000	...	100	103
" Bonds	500,000	1000	92	94
Mutual	5,000,000	100	92	94
" Bonds, gold.	900,000	1000	105	—
Municipal	1,000,000	100	—	—
New York	4,000,000	100	130	131
Suburban, W'tch'str	390,000	50	—	100
Gas Co.'s of Brooklyn.				
Brooklyn	2,000,000	25	155	160
Citizens	1,200,000	20	80	85
" Scrip	320,000	1000	95	97½
Peoples	2,000,000	10	30	35
" Bonds	$ 325,000	...	—	95
" Scrip	300,000	...	85	—
Metropolitan	1,000,000	100	—	75
Nassau	1,000,000	25	80	85
" Ctfs.	700,000	1000	96	98
Williamsburgh	1,000,000	50	120	125
" Scrip		...	100	103
Out of Town Gas Companies.				
Bath, Maine	70,000	100		
Buffalo Mutual, N. Y	750,000	100	55	—
" Bonds	200,000	1000	—	90
Baltimore, Md	2,000,000	100	134	134
" Ctfs., gold	1,000,000		106	110
Bayonne, N. J		100		90
Brockport, N. Y	25,000	100	...	80
Citizens, Newark	918,000	50	100	105
" " Bds.	124,000	—	—	—
Cincinnati G & C Co				190
Derby of Conn	160,000	100	60	80
East Boston, Mass		25	132	—
Fort Wayne, Ind		100	...	—
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	184	186
Hempstead, L. I	25,000	100	...	—
Jersey City	386,000	20	160	—
Jamaica, L. I	25,000	100	...	—
Jacksonville, Ill	120,000	50	82	...
Lewistown, Maine	400,000	100	50	85
Lima, Ohi'o	60,000	100	—	...
Bonds	30,000		90	
Laclede, St Louis Mo	1,200,000	100	100	110
Long Branch		20		95
Peoples, Jersey City		...	120	125
Peoples of Albany	650,000	100	—	20
" Bonds	350,000	1000	—	—
Peoples of Baltimore		25	76	—
" Bonds			106	—
Perth Amboy		25	—	95
Rochester, N. Y		100	50	60
Richmond Co., S. I.	300,000	...	97	100
Woonsocket, R. I	150,000	100	100	...
Halifax N. S	400,000	40	148	150
Hamilton, Ontario	150,000	40	117½	
San Francisco Gas-Co., S. Fr'isco Cal.			111	112
St. Louis, Missouri	600,000	50	73	75
Stillwater, Minn	50,000	50	—	26
Saugerties, N. Y	15,000	100	110	115
Troy, Citizens	600,000	100	—	60
Toledo, Ohio			95	97½

317 shares Manhattan Gas, sold at auction, @195½–195; 21 shares Metropolitan, N Y., @ 131½–132; 35 shares New York, @ 130½; 226 shares New York Oxygen gas company, sold for 1$ for the lot.

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Climatic Influences of the Suez Canal.—It is reported that the Suez Canal has had a very beneficial influence upon the climate of the country. During the period from 1854 to 1870—the time occupied in surveying and building the canal—scarce one day of rain was known in the year; at present there is a regular falling of dew, and two rainfalls are noted in almost every month. Vegetation has sprung up even in the desert, especially on the Asiatic side, where the moisture must originate from atmospheric deposition and not from infiltrated salt water. The climate of Suez has been markedly altered; neither the inhabitants nor tsavelers are so oppressed by the intense heat as was formerly the case.—*Deutsche Allg. Poly, Ztg.*, 1877, 190, *from Pol. Rev.*

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225 Feet of Hydraulic Main, 20 in. diameter.

160 Dip, Bridge, and Stand Pipes, 4, 5, and 6 inch.

160 Mouth Pieces, D's, 12" x 20".

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A. H. ALLEN, Secretary.
WM. J. VALENTINE, Treasurer.
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This Company is the owner of the GWYNNE-HARRIS, or AMERICAN HYDROCARBON process, for making Gas for Lighting or Heating purposes, by the perfect decomposition of superheated steam, under what is known as the

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This process has been fully tested nearly 50,000,000 cubic feet of Gas having been made under it, and fully demonstrating the fact that it is the greatest improvement ever made in the manufacture of Gas, either for Lighting or Heating purposes. With half a ton of Anthracite Coal 150,000 cubic feet of Gas per day is made from three benches, and the labor is so small that one man can attend three or four benches.

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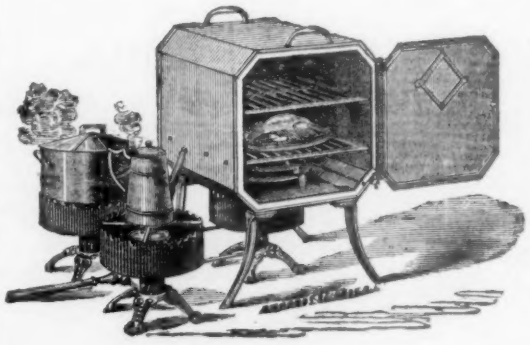

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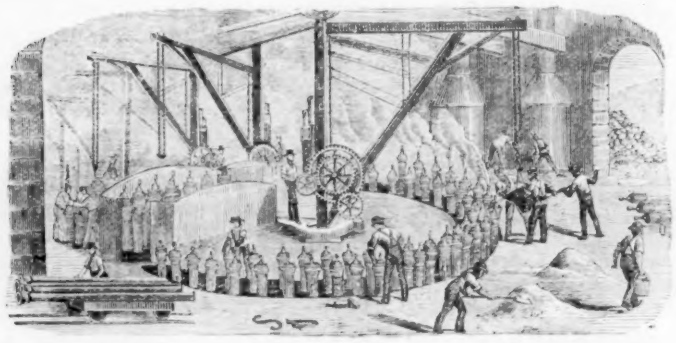

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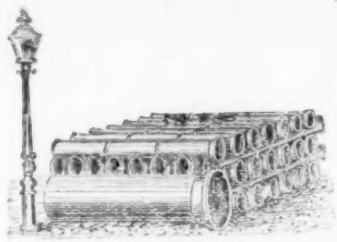

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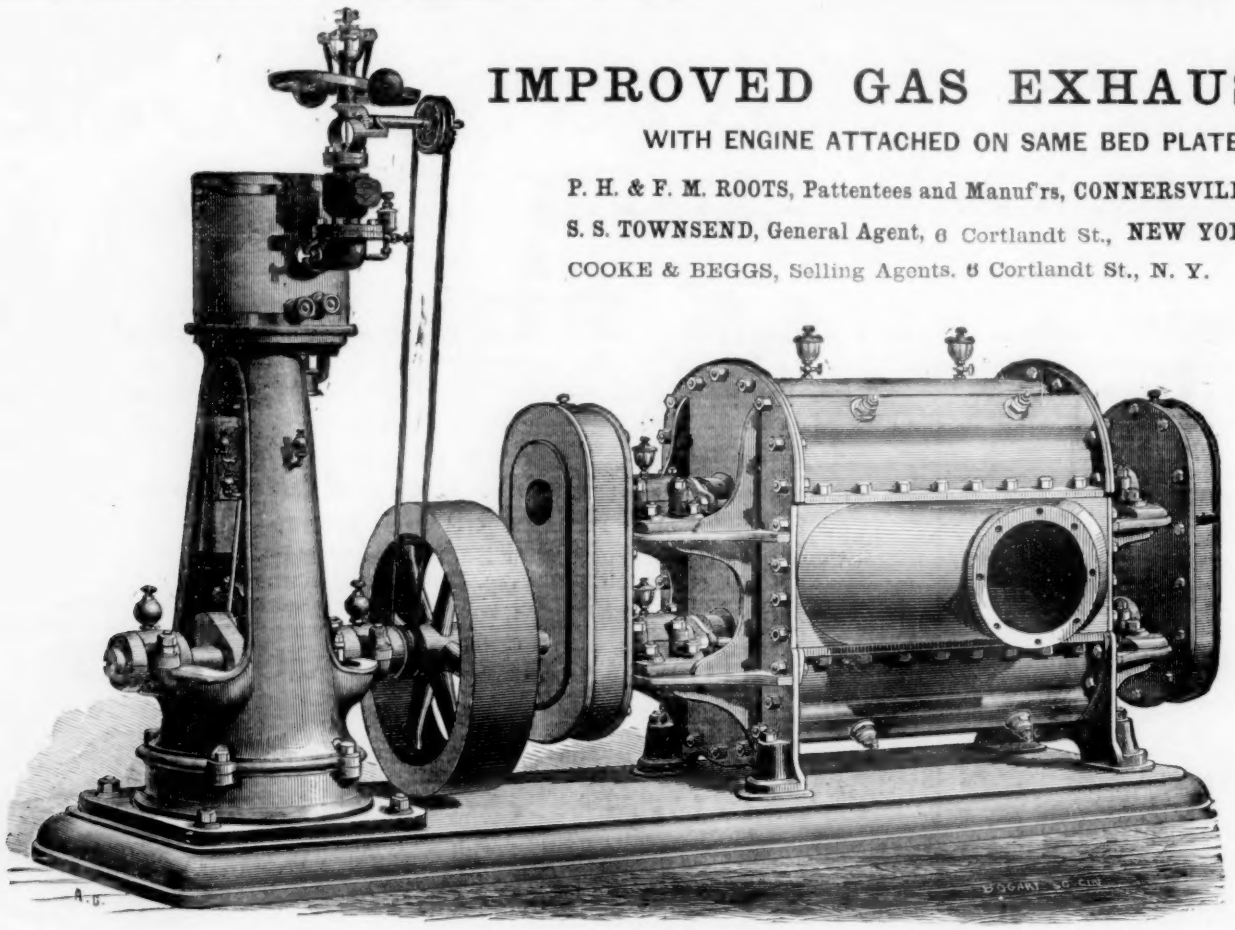

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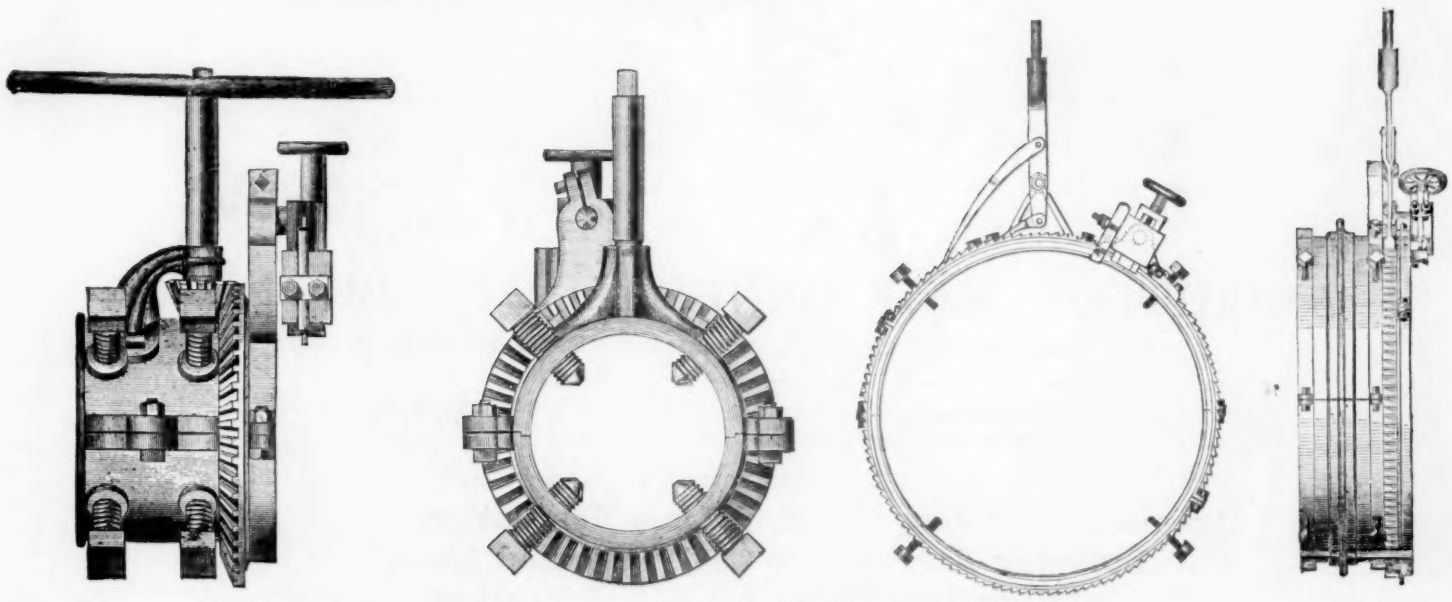

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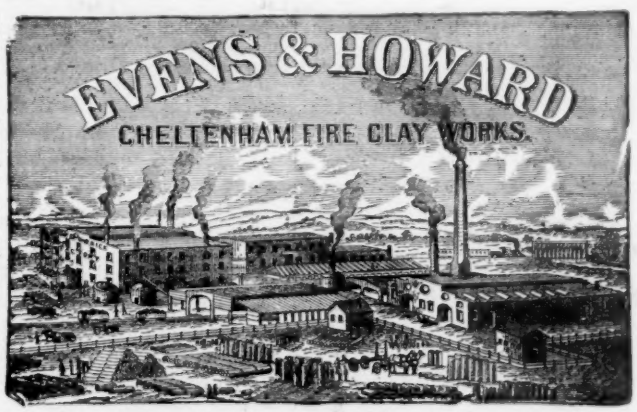

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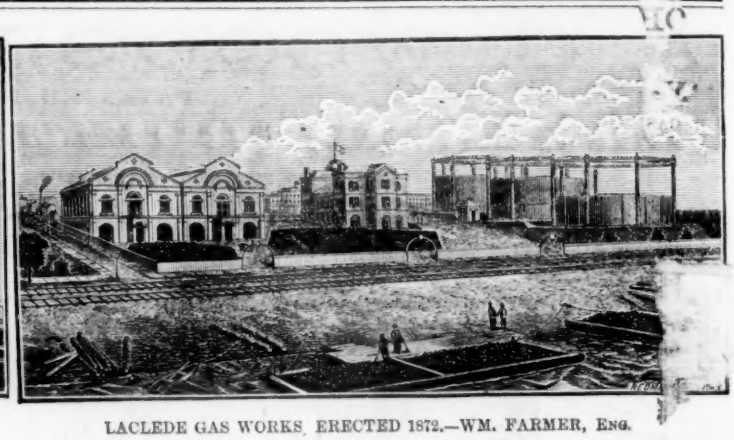

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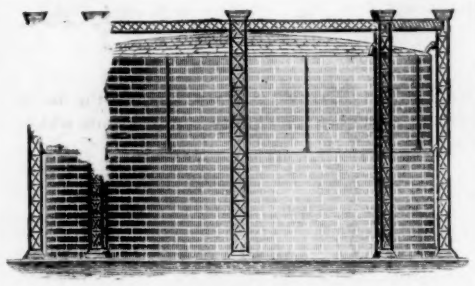

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MANUFACTURERS OF ALL THE LATEST AND MOST IMPROVED APPARATUS AND TOOLS FOR THE MANUFACTURE & DISTRIBUTION OF COAL GAS.

☞ WORKS AT THE RAILWAY DEPOTS,

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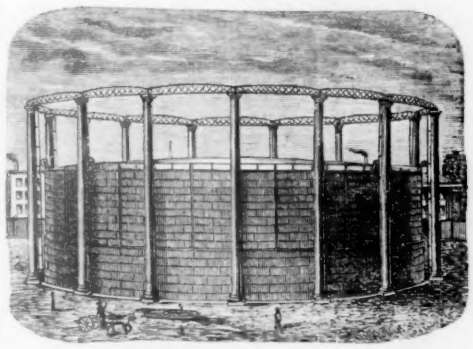

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INTERNATIONAL--1876--EXHIBITION.

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Attest—J. L. CAMPBELL, Secretary, pro-tem. Signed—A. T. GOSHORN, Director General J. R. HAWLEY, President

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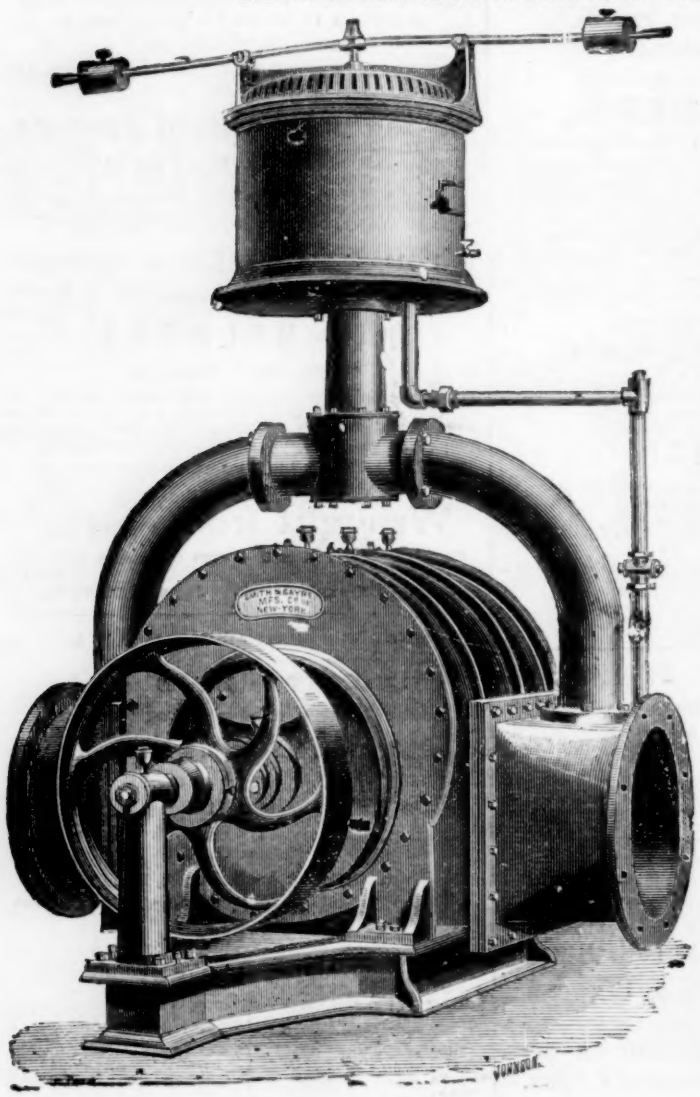

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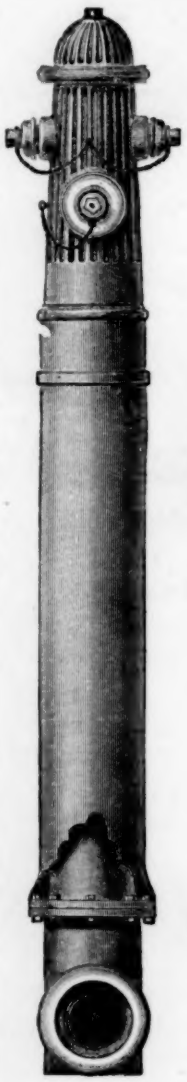

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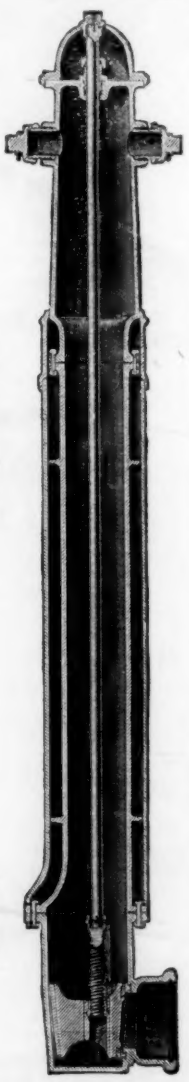

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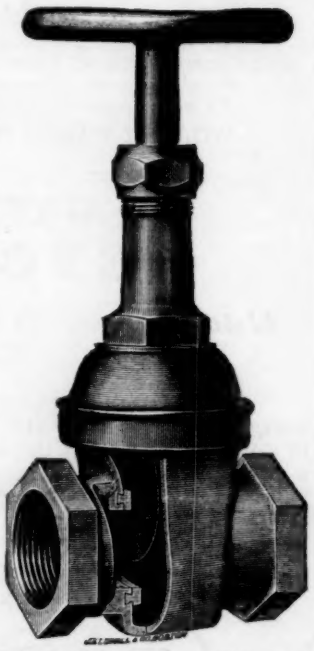

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